DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CIRCULAR NO.SU/B.Sc./08/2022

It is hereby inform to all concerned that, the syllabi prepared by the Board of Studies and Ad-hoc Boards with recommendation of the Dean, Faculty of Science & Technology, the Hon'ble Vice-Chancellor has accepted the **following syllabi of Bachelor of Science with Regulation under the scheme of Choice Based Credit & Grading System** in his emergency powers under section 12(7) of the Maharashtra Public Universities Act, 2016 on behalf of the Academic Council as appended herewith.

Sr.No.	Courses	Semester
1.	B.Sc.Electronics(Optional)	Ist and IInd semester (First Year)
2.	B.A./B.Sc.Mathematics(Optional)	Ist and IInd semester (First Year)
3.	B.Sc.Chemistry(Optional)	Ist and IInd semester (First Year)
4.	B.Sc.Physics(Optional)	Ist and IInd semester (First Year)
5.	B.Sc.Analytical Chemistry	Ist and IInd semester (First Year)
6.	B.Sc.Geology (Optional)	Ist to VIth semester (First to Third)

This is effective from the Academic Year 2022-23 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO.SU/2022/ 6852-62
Date:- 10.08.2022.

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Deputy Registrar,
Academic Section

Copy forwarded with compliments to :-

1] **The Principal of all concerned Colleges,**
Dr. Babasaheb Ambedkar Marathwada University,

2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

Copy to :-

1] The Director, Board of Examinations & Evaluation, Dr.BAMU,A'bad.

2] The Section Officer,[B.Sc.Unit] Examination Branch,Dr.BAMU,A'bad.
3] The Programmer [Computer Unit-1] Examinations, Dr.BAMU,A'bad.
4] The Programmer [Computer Unit-2] Examinations, Dr.BAMU,A'bad.
5] The In-charge,[E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr.BAMU,A'bad.
6] The Public Relation Officer, Dr.BAMU,A'bad.
7] The Record Keeper, Dr.BAMU,A'bad.

Dr. Babasaheb Ambedkar Marathwada University

Aurangabad - 431004 (MS) India

Undergraduate Bachelor Degree Program in Science (B. Sc.)

Electronics (Optional Subject)

Course Structure and Curriculum

(Outcome based Curriculum)

Choice Based Credit System

(Effective from Academic Year 2022-23)

Dr. Babasaheb Ambedkar Marathwada University

Aurangabad – 431004 (MS) India

23/05/22

Dean
Faculty of Science & Technology
Dr. Babasaheb Ambedkar Marathwada
University, Aurangabad

23/5/2022

Prof M.D. Shinde
Chairman
B.S in Electronics

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1. Preamble

Dr. Babasaheb Ambedkar Marathwada University proposes to offer a three year Bachelor program in Science (B. Sc.) with Electronics as a one of the optional subjects. The curriculum design of this program is undertaken in the following framework (assumptions).

a) Although there has been remarkable progress in all sectors of education in last couple of decades, there has been increasing crisis for truly able manpower to address the growing demands for work sectors. This has led to the widening gap between the supply and demand for skilled manpower across teaching institutions, R&D organizations and industries. Such inadequacy of knowledge acquisition and dissemination has translated directly into unemployment among an increasing number of post-graduates who pass-out every year and are forced to bare-trained in order to become marketable.

   A scientifically designed framework, which will enable students at under graduate level to be ready to face the challenges of the demand driven socio-economic profile is therefore, a call of the day. Such a course should not be occupation specific and should enable students to choose from a variety of options for their career.

   This program is designed to produce a skilled manpower in Electronics with wide variety of specialized sectors of training to improve the opportunities for the unemployed youths in both the private and public sectors.

b) According to a study conducted by the Associated Chambers of C ommerce and Industry of India (ASSOCHAM), there will be a deficit of 40 million working professionals and the employers would face the difficulty of filling positions because of the dearth of suitable talent and skilled person all in their industry. **This program aims to provide some solution for this problem and this would facilitate to improve:**

   (i) Quality of training
   (ii) High drop-out rates
   (iii) Linkages with Universities and industry
   (iv) Inadequacy of resources.

c) **This program is intended to offer practical training and skills needed to pursue an occupation straight away. It will provide options to the students to be trained in directions which are directly aligned to land a job in a chosen profession or a skilled trade.**

d) **This program is intended to offer students with life-long independent and reflective learning skills in their career.**

2. Structure and Curriculum for Bachelor of Science (B. Sc.) with Electronics as one the Optional Subjects

(Choice Based Credit System)

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Choice Based Credit System (CBCS) Curriculum
For
Faculty of Science and Technology
Course Structure and Scheme of Examination
B.Sc. Three Year Undergraduate Degree Program

Semester I

	Course Code	Course Title	Teaching time/week	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I (DSC-1A) Core Courses	ELE-111	Core Course (Theory Paper-I) **Network Analysis and Semiconductor Devices**	2 hours	2	50	10	40	20
	ELE-112	Core Course (Theory Paper-II) **Digital Electronics – I**	2 hours	2	50	10	40	20
	ELE-121	Lab course 1 (based on ELE-111 and ELE-112)	3 hours	1.5	50	10	40	20
Ability Enhancement compulsory courses (AECC-1)	XXX-131	Communication skills in English-I	3 hours	3	50	10	40	20
	XXX-132	Marathi/Hindi/Urdu/Sanskrit A student can opt for any one of these languages (SL-I)	3 hours	3	50	10	40	20
Non-Credit Course	XXX-113	Environmental Studies	2 hours	2*				
			15	11.5	250	50	200	100

Total Credits for Semester I : 11.5 (Theory : 10 ; Laboratory : 1.5)

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Semester II

	Course Code	Course Title	Teaching time/week	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I (DSC-1B) Core Courses	ELE-211	Core Course (Theory Paper-III) **Amplifiers**	2 hours	2	50	10	40	20
	ELE-212	Core Course (Theory Paper-IV) **Digital Electronics - II**	2 hours	2	50	10	40	20
	ELE-221	Lab course 2 (based on ELE-211 and ELE-212)	3 hours	1.5	50	10	40	20
Ability Enhancement compulsory courses (AECC-2)	XXX-231	Communication skills in English-II	3 hours	3	50	10	40	20
	XXX-232	Marathi/Hindi/Urdu/Sanskrit A student can opt for any one of these languages (SL-II)	3 hours	3	50	10	40	20
Non-Credit Course	XXX-213	Constitution of India	2 hours	2*				
	XXX-214	Environmental Studies	2 hours	2*				
			17	11.5	250	50	200	100

Total Credits for Semester II : 11.5 (Theory : 10 ; Laboratory : 1.5)

Semester III

	Course Code	Course Title	Teaching time/week	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I (DSC-1C) Core Courses	ELE-311	Core Course (Theory Paper-V) **Operational Amplifiers**	2 hours	2	50	10	40	20
	ELE-312	Core Course (Theory Paper-VI) **8086 Microprocessor**	2 hours	2	50	10	40	20
	ELE-321	Lab course 3 (based on ELE-311)	3 hours	1.5	50	10	40	20
	ELE-322	Lab course 4 (based on ELE-312)	3 hours	1.5	50	10	40	20
Skill Enhancement course (SEC-1)	XXX-313	SEC-1 Any one skill to be chosen out of two SEC-1(A) , SEC-1 (B)	2 hours	2	50	10	40	20

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		SEC-1(A) : Power Supply and Interrupted Power Supply **SEC-1(B) : Measuring Devices**						
Ability Enhancement compulsory courses (AECC-3)	XXX-331	Communication skills in English-III	3 hours	3	50	10	40	20
	XXX-332	Marathi/Hindi/Urdu/Sanskrit A student can opt for any one of these languages (SL-III)	3 hours	3	50	10	40	20
Non-Credit Course	XXX-333	Computer Ability	2 hours	2*				
			18	15	350	70	280	140
Total Credits for Semester III : 15 (Theory : 12 ; Laboratory : 3)								

Semester IV

	Course Code	**Course Title**	**Teaching time/week**	**Credits**	**Scheme of Examination**			
					Max Marks	**CIA**	**UA**	**Min Marks**
Optional I (DSC-1D) Core Courses	ELE-411	Core Course (Theory Paper-VII) **Communication Electronics**	2 hours	2	50	10	40	20
	ELE-412	Core Course (Theory Paper-VIII) **8086 Microprocessor Interfacing**	2 hours	2	50	10	40	20
	ELE-421	Lab course 4 (based on ELE-411)	3 hours	1.5	50	10	40	20
	ELE-422	Lab course 5 (based on ELE-412)	3 hours	1.5	50	10	40	20
Skill Enhancement course (SEC-2)	XXX-413	SEC-2 Any one skill to be chosen out of two SEC-2(C) , SEC-2 (D) **SEC-2(C) : Industrial Instrumentation** **SEC-2 (D) : Mobile Repairing**	2 hours	2	50	10	40	20
Ability Enhancement compulsory courses (AECC-4)	XXX-431	Communication skills in English-IV	3 hours	3	50	10	40	20
	XXX-432	Marathi/Hindi/Urdu/Sanskrit A student can opt for any one of these languages (SL-IV)	3 hours	3	50	10	40	20
Non-Credit Course	XXX-333	Computer Ability	2 hours	2*				
			18	15	350	70	280	140
Total Credits for Semester IV : 15 (Theory : 12 ; Laboratory : 3)								

Semester V								
	Course Code	Course Title	Teaching time/week	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I (DSE-1 A) Discipline Specific Elective	ELE-511	DSE-1A(1) (Theory Paper-IX) (Select any one paper from A1/B1/C1/D1) **A1 : Power Electronics** **B1 : Programmable Logic Controllers** **C1 : Biomedical Instrumentation** **D1 : Optoelectronics**	2 hours	2	50	10	40	20
	ELE-512	DSE-1A(2) (Theory Paper-X) (Select any one paper from A2/B2/C2/D2) **A2 : Microcontroller – I** **B2 : Nanoelectronics** **C2 : Fiber Optics Communication** **D2 : Analog circuit Design and Applications**	2 hours	2	50	10	40	20
	ELE-521	Lab course 6 (based on ELE-511)	3 hours	1.5	50	10	40	20
	ELE-522	Lab course 7 (based on ELE-512)	3 hours	1.5	50	10	40	20
Skill Enhancement course (SEC-3)	ELE-513	SEC-3 Any one skill to be chosen out of two SEC-3(E) , SEC-3 (F) **SEC-3 (E) : Mobile Application Development** **SEC-3 (F) : Solar Devices**	2 hours	2	50	10	40	20
Non-Credit Course	XXX-514	Professional Ethics and Moral Values	2 hours					
			14	9	250	50	200	100

Total Credits for Semester V : 9 (Theory : 06 ; Laboratory : 03)

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Semester VI								
	Course Code	Course Title	Teaching time/week	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I (DSE-1 B) Discipline Specific Elective	ELE-611	DSE-1B(1) (Theory Paper-XI) (Select any one paper from A3/B3/C3/D3) **A3 : Microcontroller – II** **B3 : Sensors and Systems** **C3: Manufacturing Processes for Electronics** **D3: Process Control Systems**	2 hours	2	50	10	40	20
	ELE-612	DSE-1B(2) (Theory Paper-XII) (Select any one paper from A4/B4/C4/D4) **A4 : Instrumentation** **B4 : Introduction to Robotics** **C4 : Modern Communication Systems** **D4 : Advanced Microcontroller**	2 hours	2	50	10	40	20
	ELE-621	Lab course 8 (based on ELE-611)	3 hours	1.5	50	10	40	20
	ELE-622	Lab course 9 (based on ELE-612)	3 hours	1.5	50	10	40	20
Skill Enhancement course (SEC-4)	ELE-613	SEC-4 Any one skill to be chosen out of two SEC-4(G) , SEC-4 (H) **SEC-4(G) : Design and Fabrication of PCB** **SEC-4 (H) : Internet of Things and Applications**	2 hours	2	50	10	40	20
			15	9	250	50	200	100
Total Credits for Semester V : 09 (Theory : 06 ; Laboratory : 03)								
Total Credits for three years : Sem I (11.5) + Sem II (11.5) + Sem III (15) + Sem IV (15) + Sem V (09) + Sem VI (09) = 71 Credits								

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3. Vision

To structure the Department of Electronics of affiliated colleges of this university to be an epitome of excellence in the teaching and learning process in the emerging areas of electronics by imparting time responsive quality education to facilitate the students to become highly responsible Human beings.

4. Mission

To achieve the vision, the Departments of all the affiliated Colleges will:

- Provide a platform for the students with a broad spectrum of diversity to achieve Academic Excellence with in-built Employability in the emerging areas of Electronics.
- Establish a unique learning environment to enable the students to face the challenges in the emerging areas of Electronics.
- Identify the gaps between academics and industry, and design the courses to impart technical and life skills as per the requirements of the region so as to improve employability and develop entrepreneurial capabilities.
- Adopt a perennial process for bringing excellence in teaching pedagogy by providing ICT based state-of-the-art infrastructural facilitation
- Provide a student-centric learning environment and establish a platform for inclusive research leading to the development of creative thought processes amongst students keeping in mind societal needs.
- Provide ethical and value-based education by promoting activities addressing societal needs.

5. Program Educational Objectives:

The objectives of the B. Sc. (Electronics) program are to produce graduates who -

1. Are equipped with time-relevant knowledge of various aspect of Electronics to address multi-disciplinary demands of R & D organizations, educational institutes and automated processes in modern industries.
2. Have sound background to practice advanced concepts of electronics in the various emerging areas Electronics.
3. Have an ability to pursue higher studies and succeed in academic and professional careers.
4. Have the ability to address professional demands individually and as a team member communicating effectively in a technical environment using modern tools.
5. Recognize the need for and possess the ability to engage in lifelong learning and will be sensitive to the consequences of their work both ethically and professionally for a productive professional career.

6. Programme Outcomes (POs):

- **Graduates of the B. Sc. (Electronics) program are expected to –**

- PO1. **The citizenship and society:** Apply broad understanding of ethical and professional skill in electronics subject in the context of global, economic, environmental and societal realities while encompassing relevant contemporary issues.

- PO2. **Environment and sustainability**: Apply broad understanding of impact of electronics subject in a global, economic, environmental and societal context and demonstrate the knowledge of, and need for sustainable development.

- PO3. **Ethics:** Apply ability to develop sustainable practical solutions for electronics subject related problems within positive professional and ethical boundaries.

- PO4. **Individual and team work:** Function effectively as a leader and as well as team member in diverse/ multidisciplinary environments.

- PO5. **Communication:** Communicate effectively on complex electronics subject related activities with the scientific community in particular and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

- PO6. **Project management and finance**: Demonstrate knowledge and understanding of the first principles of electronics and apply these to one's own work as a member and leader in a team, to complete project in any environment.

- PO7. **Life-long learning**: Recognize the need for lifelong learning and have the ability to engage in independent and life-long learning in the broadest context of technological change.

7. Programme Specific Outcomes:

PSO1. **Domain knowledge:** Apply the knowledge of electronics fundamental, and advanced areas of Electronics to provide comprehensive solution of problems in complex electronics.

PSO2. **Problem Analysis:** Identify electronics related problems at varied complexity and analyze the same to formulate/ develop substantiated conclusion using first principles of Electronics

PSO3. **Design Development of solutions:** Design/ develop solutions for problems at varied complexity in various areas of Electronics to address changing challenges put forward by market demand/ stakeholder

PSO4. **Conduct Investigation of complex problems:** Use established knowledge and methods to design of experiments, analyze resulting data and interpret the same to provide valid conclusions.

PSO5. **Modern tools:** Create, select, and apply appropriate techniques, resources, and modern electronics and relevant IT tools including prediction and modeling to complex electronics technology related activities with clear understanding of the limitations.

8. Eligibility:

Candidates seeking admission to the First Semester of B. Sc. in Electronics must possess the following eligibility criteria.

- Must have passed 12th Science

  OR

- Must have passed MCVC with Electronics Subject

  OR

- Two Years ITI with Electronics related trade.

- Students having Three Years Diploma (from Polytechnic College) in Electronics Engineering / Related Branch of Engineering are eligible to get direct admission to the second year of B. Sc.

9. Duration : The duration of the course will be of Six Semesters (Three Years)

10. Medium of Instructions : Medium of Instructions will be in English

11. Choice Based Credit System (CBCS):

The choice based credit system is going to be adopted by the University. This provides flexibility to make the system more responsive to the changing needs of our students, the professionals and society. It gives greater freedom to students to determine their own pace of study. The credit based system also facilitates the transfer of credits. Students will have to earn 71 credits from Electronics optional subject for the award of three year undergraduate degree Bachelor of Science (B. Sc.)

12. Credit-to-contact hour Mapping:

(a) One Credit would mean the equivalent of 15 periods of 60 minutes each for a theory lecture.

(b) For lab course/ workshops/internship/field work/project, the credit weightage for equivalent hours shall be 50% that of theory lectures.

13. Attendance:

Students must have 75 % of attendance in each course for appearing examination, otherwise he / she will be strictly not allowed for appearing the semester examination of each course. Frequent absence from regular lecture/practical course may lead to disqualification from continuous internal assessment (CIA) process in respective subject.

14. Evaluation Methods/ Scheme of Examination, Earning Credits, Grading System

Evaluation Methods:

- The assessment will be based on **20:80 ratio** of **continuous internal assessment (CIA) and semester-end examination** (SEE). **There would be combined passing in CIA and SEE.** In case of failure in SEE in a particular course(s), the exam will be conducted in an immediate subsequent semester.

- In case a student fails in a certain course(s) in a particular semester and the same course(s) are modified/ revised/ removed from the curriculum in due course, the student will have to appear as per the newly framed curriculum and/or pattern in a subsequent semester, at his/her own responsibility.

Continuous Internal Assessment (CIA):

There will be 20 marks for Continuous Internal Assessment. Two internal tests (20 marks each) will be conducted during the semester as a part of a continuous assessment. At the end of the semester, an average of two tests will be considered for the calculation of final marks.

Semester End Examination (SEE):

- The semester-end theory examination for each theory course will be for 40 marks. The total marks shall be 50 (40 marks SEE + 10 marks CIA).

- Semester end examination (SEE) time table will be declared by the University (as per the university annual calendar). The paper setting and assessment of theory courses, laboratory courses and research project will done by external examiners appointed by the University.

- Pattern of semester end examination question paper will be as below:
    - The semester-end examination of the theory course will have two parts (10 + 30 = 40 Marks)
    - Part A will be consisting of 5 questions having 2 marks each (multiple choice questions / fill in the blanks/ answer in sentence) as compulsory questions and it should cover entire course curriculum (10 Marks)
    - Part B will carry 8 questions (06 marks for each question) (02 questions from each of 04 units) and students will have to attempt any 05 questions out of 08 (30 Marks).

- 20 to 30% weightage can be given to problems/ numerical wherein the use of a non-programmable scientific calculator may be allowed.
- Number of sub-questions (with the allotment of marks) in a question may be decided by the examiner.

Earning Credits:

At the end of every semester, a letter grade will be awarded in each course for which a student had registered. A student's performance will be measured by the number of credits that he/she earned by the weighted Grade Point Average (GPA). The SGPA (Semester Grade Point Average) will be awarded after completion of the respective semester and the CGPA (Cumulative Grade Point Average) will be awarded at the final exit.

Grading System:

- The grading reflects a student-own proficiency in the course. A ten point rating scale shall be used for the evaluation of the performance of the students to provide letter grade for each course and overall grade for the Bachelor Programme. Grade points are based on the total number of marks obtained by him / her in all heads of the examination of the course. The grade points and their equivalent range of marks are shown in Table-I

Table - I: Ten point grade and grade description

Marks Obtained (%)	Grade Point	Letter Grade	Description
91-100	**10** (9.01- 10.00)	O	Outstanding
81-90	**9.0** (8.01-9.00)	A^+	Excellent
71-80	**8.0** (7.01- 8.00)	A	Very Good
61-70	**7.0** (6.01- 7.00)	B^+	Good
51-60	**6.0** (5.01- 6.00)	B	Above Average
41-50	**5**(4.01- 5.00)	C	Average
40	4.0	P	Pass
< 40	0.0	F	Fail
	0.0	AB	Absent

- Non-appearance in any examination / assessment shall be treated as the students have secured zero marks in that subject examination / assessment.
- Minimum P grade (4.00 grade points) shall be the limit to clear / pass the course / subject. A student with F grade will be considered as "failed" in the concerned course and he / she has to clear the course by appearing in the next successive semester examinations.
- Every student shall be awarded grade points out of maximum 10 points in each subject (based on 10 point scale). Based on the grade points obtained in each subject, Semester Grade Point Average (SGPA) and then Cumulative Grade Point Average (CGPA) shall be computed. Results will be announced at the end of each semester and CGPA will be given at final exit.

Computation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average)

Grade in each subject / course will be calculated based on the summation of marks obtained in all five modules.

The computation of SGPA and CGPA will be as below

- Semester Grade Point Average (SGPA) is the weighted average points obtained by the students in a semester and will be computed as follows

$$SGPA = \frac{\text{Sum (Course Credits) X Number of Grade Points in concerned Course Gained by the Student}}{\text{Sum (Course Credits)}}$$

The SGPA will be mentioned on the grade card at the end of every semester.

- The Cumulative Grade Point Average (CGPA) will be used to describe the overall performance of a student in all semester of the course and will be computed as under.

$$CGPA = \frac{\text{Sum (All Six Semester SGPA)}}{\text{Total Number of Semester}}$$

The SGPA and CGPA shall be rounded off to the second place of decimal.

Grade Card

Results will be declared by the University and the grade card (containing the grades obtained by the student along with SGPA) will be issued by the university after completion of every semester. The grade card will be consisting of following details.

- Title of the courses along with code opted by the student.
- Credits associated with the course.
- Grades and grade points secured by the student.
- Total credits earned by the student in a particular semester.
- Total credits earned by the students till that semester.
- SGPA of the student.
- CGPA of the student (at final exit).

Cumulative Grade Card

The grade card showing detail grades secured by the student in each subject in all semesters along with overall CGPA will be issued by the University at final exit.

Semester I

ELE – 111: Network Analysis and Semiconductor Devices

Total Credits: 02 Contact Hours: 30 (Clock Hours)
Marks: 50

Learning Objectives of the Course:

1. To introduce students to various components, network theorems, diodes, transistors and power supplies.
2. To make them understand the concept of network analysis, types of diodes, transistor configuration, and various aspects of regulated power supply
3. To enable students to design and construct circuits based of various network theorems, transistor configurations and half wave and full wave rectifiers

Learning Outcomes of the Course:

After completion of the course, students will be able to -

1. Apply the basic concepts of network theorems, diodes, transistors and power supplies to solve the complex problems in electronic circuits
2. Analyze various networks, diodes and transistors configuration and identify various issues of regulated power supply
3. Design an electronic circuit using various networks, diodes and transistor
4. Design and develop a low cost power supplies

Course Contents:

Unit I : Components and Network Theorems : 10 Periods

Active & passive elements, Resistors, Capacitors, Inductors, Transformers, Relays and Fuses { classification, specification & Applications},Voltage divider theorem, current divider theorem, ideal Constant voltage source, Ideal constant current source, superposition theorem, Thevenin's theorem, maximum power theorem,

Unit II : Diodes : 10 Periods

P-N junction Diode, Biasing a semiconductor diode, Static and Dynamic resistance of a diode, breakdown of PN junction, ideal diode, Special diodes (Zener diode, Tunnel diode, Varactor diode, Light Emitting diode and Photodiode)

Unit III : Transistors: 10 Periods

Transistor, transistor action, transistor symbols, transistor configurations, characteristics of transistor in common base, common emitter, common collector configurations, comparison of CE,CB and CC configuration, transistor current gains α and β, relation between α and β, Junction field effect transistor, Static characteristics of JFET, JFET characteristics with external bias, transfer characteristics, small signal JFET parameters, MOSFET.

Unit IV : Power supplies: 10 Periods

Block diagram of Regulated Power Supply, Half wave rectifier, efficiency of HWR, Full wave rectifier, Bridge rectifier, efficiency of FWR, ripple factor, types of filter circuits, Zener diode as voltage regulator, transistor series voltage regulator, fixed positive linear regulators, fixed negative linear voltage regulators

Unit V : Tutorials and Assignments (05 Periods)

Reference Books:

1. Electrical Technology – B.L.Theraja (S. Chand 2004) (Chp.1)
2. Semiconductor Electronics – A.K.Sharma New age international 1996(Chp.2)
3. Principle of electronics – V.K.Mehta (S. Chand and Co. 2004) (Chp.2, and 4)
4. Basic Electronics (solid stste) – B L Theraja (S. Chand and Co. 2012) (Chp.1, 2,3 and 4)
5. Basic Electronics by Grobe

ELE – 112: Digital Electronics – I

Total Credits: 02 Contact Hours: 30 (Clock Hours)
Marks: 50

Learning Objectives of the Course:

1. To introduce students to various fundamental concepts of digital electronics
2. To make them understand the concept of number system, logic gates, and combinational logic circuits
3. To enable students to design and construct circuits based of various logic gates and combinational logic circuits

Learning Outcomes of the Course:

After completion of the course, students will be able to -

1. Apply the basic concepts of number system, logic gates, and combinational logic circuits to solve the complex problems in electronic circuits
2. Analyze various logic gates, and combinational logic circuits to identify various issues in digital networking
3. Design various digital circuits circuit using concept of number system, logic gates, and combinational logic circuits
4. Design and develop a cost effective digital devices based on adder, subtractor, Multiplexers and demultiplexers

Course Contents:

Unit I : Number System : 12 Periods

Number System: Decimal, Binary, Hexadecimal Number Systems and their inter conversions , Binary arithmetic (addition, subtraction, multiplication and division), 1's and 2's compliment method for binary subtraction, Hexadecimal addition and subtraction, Binary Codes (8421 (BCD) code, Gray code, Excess-3 code), BCD addition and subtraction, Excess-3 addition and subtraction, ASCII Code

Unit II : Logic Gates : 08 Periods

Positive and negative logic, Logic Gates (NOT gate, AND gate, OR gate, NAND gate, NOR gate) using diodes & transistors, Ex-OR gate, Ex-NOR gate

Unit III : Boolean Algebra : 10 Periods

Boolean Operations, Rules and laws of Boolean algebra, DeMorgan's theorems, minterms, maxterms, SOP and POS form of Boolean expressions, Simplification of Boolean Expressions, Karnaugh map [K-map] (up to four variables only)

Unit IV : Combinational Logic Circuits: 10 Periods

NAND and NOR gate as universal building blocks, Half adder, Full adder, Half subtractor, full subtractor, 4 bit parallel adder and subtractor, 2's complement adder /subtractor, 3 bit binary decoder, decimal to BCD encoder, 8 to 1 multiplexer, 1 to 8 demultiplexer

Unit V : Tutorials and Assignments (05 Periods)

Reference Books:

1. Digital Fundamentals – Thomas L Floyd, Universal Book Stall New Delhi
2. Digital Electronics and Microcomputers – R.K.Gaur
3. Digital Analog Techniques – Navneth, Kale and Gokhale, Kitab Mahal
4. Digital Electronics with Practical Approach – G N Shinde, Shivani Publications Nanded
5. Digital Principles and Circuits – C B Agarwal, Himalaya Publishing House

ELE 121: Lab Course 1 (based on ELE-111 and ELE-112)

Marks: 50 **Credits: 1.5**

Every candidate appearing for the examination must produce a journal showing that he/she has completed 06 experiments during the academic year. The journal must be certified at the end of the semester / year by Head of the Department.

1. Study of PN junction diode characteristics, determination of ac and dc resistance
2. Study of zener diode characteristics, determination of VZ, IZ, ZZ.
3. Study of transistor characteristics in CE configuration, determination of α.
4. Study of JFET characteristics, determination of parameters.
5. Built and study of Full wave rectifier
6. Built and study shunt regulator using zener diode, line and load regulation
7. Built and study power supply with capacitor filter
8. Built and Built and study NOT, OR, & AND gates using Diodes and Transistor/ 74XX.
9. Built and Built and study NAND & NOR gates using Diodes and transistor/ 74XX.
10. Built and Built and study basic gates using NAND/ NOR gates.
11. Built and study of Half adder using gates.
12. Built and study of Half subtractors using gates.

Semester II

ELE – 211: Amplifiers

Total Credits: 02
Marks: 50

Contact Hours: 30 (Clock Hours)

Learning Objectives of the Course:

1. To introduce students to various fundamental concepts of Amplifiers
2. To make them understand the concept of biasing for transistor amplifiers, small signal amplifiers, feedback amplifiers, and multistage transistor amplifiers.
3. To enable students to design and construct circuits based of various small signal amplifiers, and multistage transistor amplifiers.

Learning Outcomes of the Course:

After completion of the course, students will be able to -

1. Apply the basic concepts of biasing for transistor amplifiers, small signal amplifiers, feedback amplifiers, and multistage transistor amplifiers to solve the complex problems in electronic circuits
2. Analyze various transistor amplifiers, small signal amplifiers, feedback amplifiers, and multistage transistor amplifiers to identify various issues in Electronic circuits
4. Design various electronics circuits' circuit using concept of small signal amplifiers, and multistage transistor amplifiers.
5. Design and develop a cost effective electronic devices based on small signal amplifiers, and multistage transistor amplifiers.

Course Contents:

Unit I: Bias for Transistor Amplifiers: 10 Periods

Transistor load line analysis, Operating point, Inherent variation of transistor parameters, Stabilisation, essentials of transistor biasing circuit, stability factor, methods of transistor biasing, base resistor method, voltage divider bias method.

Unit II : Small signal Amplifiers : 10 Periods

Two port network, h-parameter equivalent circuit, equivalent circuit for BJT, transconductance model, CE amplifier, CB amplifier, emitter follower circuit, equivalent circuit for JFET, Common Source amplifier, source follower amplifier

Unit III : Feedback Amplifier : 10 Periods

An amplifier black box with feedback, stabilization of gain by negative feedback, reduction of nonlinear distortion by negative feedback, , effect of feedback on output resistance, effect of feedback on input resistance, voltage series feedback.

Unit IV : Multistage Transistor Amplifier : 10 Periods

Multistage transistor amplifier, important terms, RC coupled transistor amplifier, direct coupled amplifier

Unit V : Tutorials and Assignments (05 Periods)

Reference Books:

1. Electronics fundamentals and applications–J.D.Ryder,5th ed. (Chp. 1, 2 and 3)
2. Principle of electronics - V.K.Mehta (S Chand and co. 2004)(Chp.1 and 4)

ELE – 212: Digital Electronics – II

Total Credits: 02
Marks: 50

Contact Hours: 30 (Clock Hours)

Learning Objectives of the Course:

1. To introduce students to various advance concepts of digital electronics
2. To make them understand the concept of flip-flops, counters, shift registers, memories, analogue to digital and digital to analogue converters.
3. To enable students to design and construct circuits based of various flip-flops, counters, shift registers, memories, analogue to digital and digital to analogue converters.

Learning Outcomes of the Course:

After completion of the course, students will be able to -

1. Apply the basic concepts of flip-flops, counters, shift registers, memories, and analogue to digital / digital to analogue converters to solve the complex problems in electronic circuits
2. Analyze various flip-flops, counters, shift registers, memories, and analogue to digital / digital to analogue converters to identify various issues in digital networking
3. Design various digital circuits using concept of flip-flops, counters, shift registers, memories, and analogue to digital / digital to analogue converters.
4. Design and develop a cost effective digital devices based on flip-flops, counters, shift registers, memories, and analogue to digital / digital to analogue converters.

Course Contents:

Unit I: Flip-Flops : 08 Periods

Flip flops (SR, D, JK and T) [using gates], Methods of triggering flip flops, Edge triggered flip flops (SR, D, JK and T), Asynchronous inputs, Master slave JK flip flop, Operating characteristics

Unit II : Counters: : 08 Periods

Concept of counter, Asynchronous Counters (three and four bit), Synchronous Counters (three and four bit), decade Counter (asynchronous), Up/Down Synchronous Counter (three bit only)

Unit III : Shift Registers : 08 Periods

Shift register functions, Serial In – Serial Out Shift Register, Serial In – Parallel Out Shift Register, Parallel In – Serial Out Shift Register, Parallel In – Parallel Out Shift Register, Bidirectional Shift Register, Ring Counter, Buffer Register

Unit IV : Memories / D/A and A/D converters: : 16 Periods

Memory Concept, Read Only Memory (ROM), Programmable ROMs (PROMs & EPROMs), Random Access (Read / Write) Memories (RAMs), R-2R Ladder type D/A converter, DAC Characteristics (Monotonicity, Resolution, Accuracy and Setting Time), Successive approximation A/D converter, Dual slope A/D converter

Unit V : Tutorials and Assignments (05 Periods)

Reference Books:

1. Digital Fundamentals – Thomas L Floyd, Universal Book Stall New Delhi
2. Digital Electronics and Microcomputers – R K Gaur
3. Digital Analog Techniques – Navneeth, Kale and Gokhale, Kitab Mahal
6. Digital Electronics with Practical Approach – G N Shinde, Shivani Publication Nanded
7. Digital Principles and Circuits – C B Agarwal, Himalaya Publishing House

ELE : 221 : Lab course 2 (based on ELE-211 and ELE-212)

Marks: 50 **(Practical: 40 Marks and Mini Project: 10 Marks)** **Credits: 1.5**

Every candidate appearing for the examination must produce a journal showing that he/she has completed 04 experiments during the academic year. The journal must be certified at the end of the year by the Head of the Department.

1. Built and study CE amplifier, plot the frequency response curve and find 3 dB bandwidth
2. Built and study common source FET amplifier, plot the frequency response curve and find 3 dB bandwidth
3. Built and study current series feedback amplifier, plot frequency response curve with and without feedback
4. Built and study two stage RC coupled CE amplifier, plot the frequency response curve and find 3 dB bandwidth
5. Built and study JK, T and D- Flip-Flops using IC 7476
6. Built and study 4-bit binary parallel adder / subtractor using IC 7483
7. Built and study MOD 16 Asynchronous binary UP counter
8. Built and study binary decade counter IC 7490
9. Built and study D/A converter using R-2R ladder network

The students should work on a mini-project and submit it at the time of examination along with the project report.