30/08/202

BOARD OF STUDIES MEETING FOR ELECTRONICS (Major & Minor) PROGRAMMES 2023-24.

DEPARTMENT OF ELECTRONICS,
Government College (A),
RAJAHMUNDRY -AP- 533105

INDEX

GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY

(Estd: 1853, Affiliated to Adikavi Nannaya University)
An Autonomous Institution since 2000
Accredited by NAAC (RAF-2017) with "A+" Grade (CGPA: 3.38/4.00)
College with Potential for Excellence (2016-21)
East Godavari District, ANDHRA PRADESH, INDIA 533 105

Website: www.gcrjy.ac.in
email: gcrjy1853@gcrjy.ac.in
Dr. Krishna Chappidi
M.Sc. Tech., NET, Ph.D.
Principal
Office: 0883-2475732
Mobile: 9440093239
email: geokrishna1@yahoo.co.in

Cir No: Spl/01/GCRJY/Board of Studies Meeting 2023-24 in Single Major System, Dt.01-07-2023

To
All Heads of the Departments
Government College (Autonomous) Rajahmundry

As you are aware that landmark reforms are happening in Higher Education System in Andhra Pradesh. One of the major reforms is the conversion into single major system from 3 major system. The GCRJY always strives to enhance the quality of education and academic standards for the benefit of the students.

In this context, we have decided to conduct Board of Studies (BoS) meetings in order to review and revamp the curriculum for our various academic programs (UG) offered by the college. This BoS meeting will serve as an opportunity for all Heads of the Departments to collaborate and exchange ideas with experts in the subject concerned from university, other academic institutions and industry, resulting in the development of a more comprehensive and effective curriculum.

To ensure uniformity and consistency across all departments, it is imperative that we adopt a standardized approach to curriculum design. Therefore, I instruct all Heads of the Departments to utilize Bloom's Taxonomy as a framework for designing the curriculum which provides a structured method for developing educational objectives and aligning them with appropriate teaching strategies and assessment methods.

Further, I request each department to prepare a model question paper that aligns with the revised curriculum and follows the principles of Bloom's Taxonomy. This will help our students develop higher-order thinking skills and encourage critical analysis and application of knowledge.

You are also requested to identify the potential paper setters and examiners for your respective departments. These individuals should possess the necessary expertise and experience in the subject matter to ensure fair and unbiased evaluation mechanism.

The scheduled date for the BoS meeting is 10 July 2023, at 10:00 AM onwards in the departments concerned. I kindly request all Heads of the Departments to make the necessary arrangements to conduct this meeting. Please contact the list of experts mentioned in the proceedings issued by the principal well in advance and make sure the meeting is conducted with all the members.

You have been given the liberty to conduct the meeting offline or online or in blended mode. Please follow the guidelines given by Academic Cell in conducting the BoS meeting.

Your active involvement and valuable contributions to this meeting will undoubtedly play a crucial role in the continuous improvement of our academic programs. Kindly note that, together we can create an environment that fosters excellence and prepares our students for future challenges.

C. KRISHNA
Principal

To
All HoDs and Faculty members
Coordinator, IQAC

Government College (Autonomous) Rajahmundry

Guidelines for Design & Development of Curriculum

Under single major system 2023-24

Introduction

The Government of Andhra Pradesh has introduced 4-year honours degree programme in a single major from the academic year 2023-24.

The existing CBCS in 3 major system is redesigned and rolled out a 4-year UG honours programme from the year 2020-21 in consonance with the National Education Policy (NEP)-2020. As per the UGC guidelines released during December 2022, for a new student-centric 'Curriculum and Credit Framework and Undergraduate Programmes' (CCFUP), it had to redesign the curricular framework for the 4-year honours programmes with a single major and one minor to incorporate a flexible choice-based credit system, multi-disciplinary approach and multi entry and exit options for facilitating students to pursue their career path by choosing the subject / field of their interest.

The honours degree in a single major would give the students an opportunity to pursue an in-depth study of a particular subject or discipline, and equip them with the knowledge required to pursue a Ph.D that needed independent learning and research.

Along with the single major, the students will also study one minor course, which can be done either online (such as Swayam, NPTEL, UGC, or any other Edu Tech company) or offline mode. The minor courses are introduced to enhance the employability skills of students and are offered as an open vertical.

Students will be eligible to pursue a postgraduate (PG) course in the minor selected, as the minor courses are assigned with 24 credits required for admission into PG programme in a particular subject.

Multidisciplinary courses

All the UG students are needed to undergo multidisciplinary courses, intended to broaden their intellectual experience and form part of liberal arts and science education.

The three multidisciplinary courses in five disciplines included natural and physical sciences; mathematics, statistics and computer applications, library, information and media sciences; commerce and management; and humanities and social sciences.

To enhance students' skills, a pool of skill enhancement courses would be designed by incorporating business skills, technology skills, data science and digital and human skills.

Preparing BoS Document

1. Please go through the guidelines given by UGC for Curriculum and Credit Framework and Undergraduate Programmes' (CCFUP)

2. Refer the Curriculum Framework given by the College

3. Your BoS document should contain the following contents in order

a. Proceedings of the Principal

b. Composition of BoS

c. Resolutions adopted in the BoS meeting

d. Table showing Members present with signatures

e. List of Examiners & Paper Setters

f. Program Specific Outcomes of the Program

g. Credit Framework for entire program

h. Table showing the list of courses offered in the program with credits for both theory and lab courses 4

i. Table showing the list of other minor courses if any offered by the department.

j. Detailed syllabus along with Course objectives and course outcomes

k. At least one co-curricular activity along with their evaluation method must be proposed for each unit of the syllabus.

l. List of experiments for lab course in case of science subjects

m. Model question paper designed in Bloom's Taxonomy along with Blue print.

Note: For points f to l, please refer model document given by the Academic Cell of the College

n. All the certificate courses proposed for the calendar year 2023, Seminars/ workshops, field visits, department- specific activities, special days related to the subject and study tours for 2023-24 should be placed before the respective Board and get them approved.

o. Tentative budget proposal for activities mentioned in the above point should be approved by the respective Board of Studies.

p. The topics for CSP should be placed before the respective Board and get them approved.

q. Try to incorporate SWAYAM/NPTEL MOOCs in the curriculum wherever it suits the curriculum for the benefit of the students.

r. 2 hard copies & 2 soft copies of the BoS document should be submitted along with the original bills to the Academic Cell within 2 weeks after completion of BoS for settlement of the bills and also for get them approved in Academic Council meeting.

Government College (Autonomous) Rajahmundry

Curriculum 2023-24 Version: 1.0

Title of the Program:

B.Sc. (Hons)
ELECTRONICS (Major)

Program Specific Outcomes (PSOs)

The following program outcomes have been identified for B.Sc (HONOURS) Electronics:

PSO1: Ability to apply knowledge of mathematics & science in solving electronics related problems.

PSO2: Ability to design and conduct electronics experiments, as well as to analyze and interpret data.

PSO3: Ability to design and manage electronic systems or processes that conforms to a given specification within ethical and economic constraints.

PSO4: Ability to identify, formulate, solve and analyze the problems in various disciplines of electronics.

PSO5: Ability to function as a member of a multidisciplinary team with sense of ethics, integrity and social responsibility.

PSO6: Ability to communicate effectively in term of oral and written communication skills.

PSO7: Recognize the need for, and be able to engage in lifelong learning.

PSO8: Ability to use techniques, skills and modern technological/scientific/engineering software/tools for professional practices.

Proceedings of the Principal, Government College (Autonomous), Rajahmundry
Present: Dr. C. Krishna, M.Sc.Tech, NET., Ph.D.

Rc. No: Spl./Acad.Cell-GCRJY/BOS/2023-24, Dated: 28 June 2023

Sub:- Government College (Autonomous), Rajahmundry– **Boards of Studies** (BoS) –2023- 24 Nomination of Members - Orders Issued.

Ref:- 1. UGC Guidelines for Autonomous Colleges - 2018.

2. Proceedings of the Vice-Chancellor, ANUR No. ANUR Government College (A) Rajahmundry, dated 01-06-2023.
3. UGC, Curriculum and Credit Framework for undergraduate programs dated 7 December 2022.

****

ORDER:

The Principal, Government College (Autonomous), Rajahmundry is pleased to constitute the **Board of Studies in Physics & Electronics** for framing the syllabi in Electronics subject for all semesters under **single major system** duly following the norms of the UGC Autonomous guidelines 2018 and curriculum framework issued by UGC for single major system vide Ref.3 above.

S. No	Name	Designation
1	Ch. Komala lakshmi	Chairman
2	All Faculty members in the department	Member
3	Sri E Nageswara Rao, Lecturer in Physics,Government Degree College(W), Nidadavole	Subject Expert
4	Dr. N Udaya Sri, Lecturer in Physics, DNR College, Bhimavaram	Subject Expert
5	Sri PVL Narayana, Lecturer in Physics, Government Degree College (M)Nidadavole.	University Nominee

6	Sri AV Rama Suresh,ADO Transco Bommuru, Rajahmundry	Expert from Industry/Corporate Sector
7	Jasmin Sultana	Student Nominee

The above members are requested to attend the BOS meetings and share their valuable views, and suggestions on the following functionaries:

(a) Prepare syllabi for the subject keeping in view the objectives of the college, the interest of the stakeholders and national requirements for consideration and approval of the Academic Council

(b) Suggest methodologies for innovative teaching and evaluation techniques

(c) Suggest a panel of names to the Academic Council for the appointment of examiners

(d) Coordinate research, teaching, extension, and other activities in the department of the college.

The term of the members will be Two years from the date of issue of this proceedings. The Chairman of the BoS (HoD/lecturer In-Charge of the department) is directed to coordinate with the Principal of the College and conduct BoS meetings as and when necessary, but at least twice a year.

Note: For further information, please go through the guidelines provided by the Academic Cell of the College.

C. KRISHNA

PRINCIPAL
GOVERNMENT COLLEGE [A]
RAJAHMUNDRY

Copy to:
1. The above individuals
2. File

GOVERNMENT COLLEGE (AUTONOMOUS):: RAJAMAHENDRAVARAM

(Re-Accredited by NAAC "A+" Grade with CGPA 3.38*)*

DEPARTMENT OF ELECTRONICS

BOARD OF STUDIES MEETING: 30 Aug 2023

BOS MEMBERS: 2023-24

The Board of studies meeting of **DEPARTMENT OF PHYSICS & ELECTRONNICS** was conducted at 10.00 A.M on 30/08/2023 under the Chairmanship of **Smt. Ch. Komala Lakshmi, In-charge** of the Department. The members attended have discussed various aspects such as changes to be made in the Syllabi, Scheme of Evaluation and Blue print of three year B.Sc., Electronics course both for theory and practical papers, Departmental activities for 2023-24, Estimated Budget proposals-2023-24 for implementing them effectively during ALL semesters for the academic year 2023-24 .

List of Board of Studies Members Present:

S.No	Name	Designation	Signature
1	Smt. Ch. Komala Lakshmi Lecturer in charge Department of Physics & Electronics Government College(A), Rajamahendravaram	Chairman	
2	All Faculty members in the department(List enclosed)		
3	Sri E.Nageswara Rao Lecturer in Physics, GDC(M),Nidadavole , E.G.Dist	Subject expert	
4	Dr.N.Udaya sri Lecturer in Physics, D.N.R College, Bhimavaram	Subject expert	
5	Sri PV L Narayana Lecturer in Physics, GDC (W), Nidadavole, E.G.Dist	University Nominee	
6	Sri A.Suresh,A.D.E A.P TRANSCO ,RAJAHMUNDRY	Expert from Industry/Corporate Sector(AP Transco)	
7	Kum. Jasmine Sultana	Student Nominee	

SL.NO	Name of the Faculty	Signature of the Faculty
1	Smt.Ch.Komala Lakshmi	
2	Dr.Lt.Esub Basha shaik	
3	B.Durga Lakshmi	
4	G.Srinivasa Rao	
5	K.Venkateswara Rao	
6	Dr.D.Sanjeek kumar	
7	Y.Ramu	
8	Dr.B.Gowri Naidu	
9	Dr.B.Harinadth Reddy	
10	G.Prasad Babu	
11	Dr.K. Bhargavi	
12	Dr.K.Suresh	
13	J.Niranjana Rao	
14	P.Padmavathi	
15	Dr.B.lakshmana Rao	
16	Dr.Ch.Ch.Srinivasu	
17	Dr.P.V.S.S.S.N. Reddy	
18	B.Rajasekhar	
19	N.Venkanna Babu	
20	B.P.V.V.B.Narasimha Rao	
21	Kum.D.Sri Devi	

The following documents are submitted to the Academic Coordinator and Controller of Examinations.

1. Resolutions of Board of Studies Meeting
2. Syllabi of I,II,III, IV, V, VI semesters
3. Blue print and model question paper for both theory and Practical Examinations
4. Revised Examiners list
5. Any other new proposals

Date:

Chairman
Board of Studies
Department of Physics & Electronics

AGENDA

- ✔ **Syllabi regarding All semesters of B.Sc. Programmes**
- ✔ **Credit Allocation for All semesters Electronics courses of B.Sc. Programme.**
- ✔ **Departmental activities proposed during 2023-24 academic year.**
- ✔ **Certificate courses offered by the Department.**
- ✔ **Budget proposal for the academic year 2023-24.**
- ✔ **Revised List of Examiners.**

GOVERNMENT COLLEGE (AUTONOMOUS): RAJAHMUNDRY
(Re-Accredited* by NAAC "A^{+}" Grade with CGPA 3.38*)
DEPARTMENT OF ELECTRONICS
BOARD OF STUDIES MEETING ON 30 AUG 2023

RESOLUTIONS

1. Syllabi regarding All semesters of B.Sc. Programmes

The Board of studies meeting was conducted online with faculty members of the department, University nominee, subject experts, Industrial nominee and student representatives. They have participated in the discussion for all semesters' courses, Certificate course offered by the department and after thorough discussion the syllabi adopted for the academic year 2023-24.
It is resolved to approve the syllabus designed under the flexibility of autonomy considering the syllabus based on APSCHE, Affiliated University, feedback from stake holders and local needs of Industry for I, II, III, IV, V and VI Semesters of B.Sc., Programs for the academic year 2023-24.

2. Credit Allocation for All semesters of B.Sc. Programme

It is resolved to approve the credit allocation for all semester of B.Sc. program as it was proposed by the controller of the examinations as per the guidelines of the competent authorities.

3. Departmental activities during 2023-24 academic year

It is resolved to approve the activities proposed by the department in association with the department of physics & Electronics. As mentioned here

Field Trip to Polavaram Project/

I week Project work on Arduinos technology for Final year students

Guest Lectures

State level Seminar on Micro Electronics

Open Day (All the labs are open for the City people/students to visit)

National Science Day Celebrations

Guest Lectures

Birth Day Celebrations of physicists.

4. Certificate courses offered by the Department of Electronics

The department offered certificate course Titled **"BASICS OF PHOTOGRAPHY"** and was resolved to continue this academic year as it is useful to the students as employable program.

5. Budget proposal for the academic year 2023-24.

The practicals for the courses offered by the department being conducted in the physics laboratories and hence it is resolved to follow the proposals submitted by the physics department.

6. **Revised List of Examiners.**

   It is resolved to approve the revised list of examiners as mentioned.

7. It is resolved to approve the **Choice Based Credit System [CBCS]** for B.Sc., Programme for the academic year 2023-24, in continuation with the academic year 2022-23 and 2021-22.
8. It is resolved to evaluate the student's performance under Continuous Internal Assessment (CIA) and Semester End Examination (SEE) components at 50:50 for the All B.Sc., Programme for the academic year 2023 -24. The duration of the Semester End Examination is 2:30 hrs.
9. It is resolved to approve the prescribed and Reference books for the syllabus designed.
10. It is resolved to approve community projects for the 2023-24 admitted students at the end of first year. Some sample project proposals are
    a. Home automation status in Rajahmundry
    b. Industrial automation status in Rajahmundry
    c. Electrical and Electronics safety measures in domestic sector
    d. Electrical and electronic safety measures in industry sector
11. It is resolved to approve the Scheme of Examination and Blue print of Semester End Examination (SEE) for All Semesters for the academic year 2023-24.
12. As it was proposed by the BOS committee with experts after through discussion, it is resolved to separate 25% online teaching content and 75% offline teaching content, as suggested by University nominee if necessary due to pandemic situation. Since all topics are ready for online teaching, the choice is left to the faculty.
13. It is resolved to approve the student activities cum practicals proposed semester vise for the academic year 2023-24 onwards.
14. It is resolved to introduce simulation tools for online/offline laboratory sessions, as suggested by subject experts.

SCHEME FOR SEMESTER END THEORY EXAMINATION (SEE) FOR All B.Sc., Courses:

TYPE OF QUESTION	MARK	SCHEME
PART-A Essay Questions	Each question carries 7 Marks **5x7 = 35 M**	**Answer all questions** 1. (A) & (B) - From Unit I 2. (A) & (B) – From Unit II 3. (A) & (B) - From Unit III 4. (A) & (B) - From Unit IV 5. (A) & (B) -From Unit V
PART-B Short Answer Questions	Each question carries 3 Marks **5x3= 15 M**	**Answer any 5 out of 8 questions** 6 7 8 9 } 4 Theoretical Questions Not more than one question from Any unit. 09 10 11 } Numerical Questions Not more than one question From any unit.

SCHEME FOR INTERNAL & EXTERNAL PRACTICALEXAMINATION:

S.No	Description	Marks
1	Formula	05
2	Tabular Form &Observations	15
3	Calculations & Result (Including Graph)	10
4	Precautions & Units	05
5	Viva Voce	05
6	Record**	10
7	**TOTAL**	**50**
INTERNAL: 50 M	**EXTERNAL: 50 M**	**TOTAL: 100 M**

*Award of marks for number of practical's done and recorded

06 Practical's or more than 6 - 10
05 Practical's - 08
04 Practical's- 06
03 Practical's - 04
Less than 03 - 00

15. It is resolved to approve continuous internal assessment for all semester is as follow

1. DIRECT ASSESSEMENT (20M)

A. Test - 20M (with in the first two units)

2. INDIRECT ASSESSEMENT (30M)

B. Multiple choice test (online) – 10M
C. Attendance – 5M above 90% - 5M , 80-90% - 4M, 75-80% - 3M ,65-70% - 2M
D. Assignments – 5M (Minimum of 10)
E. Any two pedagogical methods – 2x5=10M

16. It is resolved to continue the scheme of evaluation for practical examination for all semester for a maximum of 50 marks for external and 50 marks for internal.

17. It is resolved to approve the revised list of examiners and paper setters for the academic year 2023-24. List annexed.

Date:

Chairman
Board of Studies

Department of Physics & Electronics

Programme: B.Sc. Honours in Electronics (Major)

w.e.f. AY 2023-24

COURSE STRUCTURE & ALLOCATION OF CREDITS

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	I	1	Essentials and Applications of Mathematical, Physical and Chemical Sciences	3+2	4
	I	2	Advances in Mathematical, Physical and Chemical Sciences	3+2	4
	II	3	Fundamental of Electricity and Electronics	3	3
			Fundamental of Electricity and Electronics Practical Course	2	1
	II	4	Circuit theory and electronic devices	3	3
			Circuit theory and electronic devices Practical Course	2	1
		5	Semiconductor devices and Materials	3	3
			Semiconductor devices and Materials Practical Course	2	1

II	III	6	Digital Electronics	3	3
			Digital Electronics Practical Course	2	1
		7	Analog Electronics	3	3
			Analog Electronics Practical Course	2	1
		8	Electronic communication system	3	3
			Electronic communication system Practical Course	2	1
	IV	9	Electrical and electronics instrumentation	3	3
			Electrical and electronics instrumentation Practical Course	2	1
		10	Microcontrol system	3	3
			Microcontrol system Practical Course	2	1
		11	Microprocessor system	3	3
			Microprocessor system Practical Course	2	1

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
III	V	12	Cellular Mobile Communication	3	3
			Cellular Mobile Communication Practical Course	2	1
		13	Computer Network	3	3
			Computer Network Practical Course	2	1
		14 A	Industrial Electronics	3	3
			Industrial Electronics Practical Course	2	1
		OR			
		14 B	Embedded system Design	3	3
			Embedded system Design Practical Course	2	1
		15 A	Digital system Design	3	3
			Digital system Design Practical Course	2	1
		OR			
		15 B	Consumer Electronics	3	3
			Consumer Electronics Practical Course	2	1
	VI	Internship			

SYLLABI

	Government College (Autonomous) Rajahmundry (As Approved in the BOS meeting held on 30 AUGUST for 2023-24)	**Program & Semester** I B.Sc. (I Sem)			
Course Code ELE 001	**ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:		5	0	-	4

Course Objectives:

The objective of this course is to provide students with a comprehensive understanding of the essential concepts and applications of mathematical, physical, and chemical sciences.

The course aims to develop students' critical thinking, problem-solving, and analytical skills in these areas, enabling them to apply scientific principles to real-world situations.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures
CO2	To Explain the basic principles and concepts underlying a broad range of fundamental areas of physics and to Connect their knowledge of physics to everyday situations
CO3	To Explain the basic principles and concepts underlying a broad range of fundamental areas of chemistry and to Connect their knowledge of chemistry to daily life.

CO4	Understand the interplay and connections between mathematics, physics, and chemistry in various applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.
CO5	To explore the history and evolution of the Internet and to gain an understanding of network security concepts, including threats, vulnerabilities, and countermeasures.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

UNIT I: ESSENTIALS OF MATHEMATICS:

Complex Numbers: Introduction of the new symbol i – General form of a complex number – Modulus-Amplitude form and conversions

Trigonometric Ratios: Trigonometric Ratios and their relations – Problems on calculation of angles**Vectors:** Definition of vector addition – Cartesian form – Scalar and vector product and problems **Statistical Measures**: Mean, Median, Mode of a data and problems

UNIT II: ESSENTIALS OF PHYSICS:

Definition and Scope of Physics- Measurements and Units - Motion of objects: Newtonian Mechanics and relativistic mechanics perspective - Laws of Thermodynamics and Significance- Acoustic waves and electromagnetic waves- Electric and Magnetic fields and their interactions- Behaviour of atomic and nuclear particles- Wave-particle duality, the uncertainty principle- Theories and understanding of universe

UNIT III: ESSENTIALS OF CHEMISTRY:

Definition and Scope of Chemistry- Importance of Chemistry in daily life - Branches of chemistry and significance- Periodic Table- Electronic Configuration, chemical changes, classification of matter, Biomolecules- carbohydrates, proteins, fats and vitamins.

UNIT IV: APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY:

Applications of Mathematics in Physics & Chemistry: Calculus , Differential Equations & Complex Analysis

Application of Physics in Industry and Technology: Electronics and Semiconductor Industry, Robotics and Automation, Automotive and Aerospace Industries, Quality Control and Instrumentation, Environmental Monitoring and Sustainable Technologies.

Application of Chemistry in Industry and Technology: Chemical Manufacturing, Pharmaceuticals and Drug Discovery, Materials Science, Food and Beverage Industry.

UNIT V: ESSENTIALS OF COMPUTER SCIENCE:

Milestones of computer evolution - Internet, history, Internet Service Providers, Types of Networks, IP, Domain Name Services, applications.

Ethical and social implications: Network and security concepts- Information Assurance Fundamentals, Cryptography-Symmetric and Asymmetric, Malware, Firewalls, Fraud Techniques- Privacy and Data Protection

Recommended books:

1. Functions of one complex variable by John.B.Conway, Springer- Verlag.

2. Elementary Trigonometry by H.S.Hall and S.R.Knight

3.Vector Algebra by A.R.Vasishtha, Krishna Prakashan Media(P)Ltd.

4.Basic Statistics by B.L.Agarwal, New age international Publishers

5. University Physics with Modern Physics by Hugh D. Young and Roger A. Freedman

6. Fundamentals of Physics by David Halliday, Robert Resnick, and Jearl Walker

7. Physics for Scientists and Engineers with Modern Physics" by Raymond A. Serway and John W. Jewett Jr.

8. Physics for Technology and Engineering" by John Bird

9. Chemistry in daily life by Kirpal Singh

10. Chemistry of bio molecules by S. P. Bhutan

11. Fundamentals of Computers by V. Raja Raman

12. Cyber Security Essentials by James Graham, Richard Howard, Ryan Olson

Web Links:

1.
2.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1													
CO2													
CO3													
CO4													
CO5													

GOVERNMENT COLLEGE (A): RAJAMAHENDRAVARAM
DEPARTMENT OF ELECTRONICS
SYLLABUS FOR I B.Sc., ELECTRONICS

MODULE-I [**ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL ANDCHEMICAL SCIENCES**]
SEMESTER I
(As Approved in the BOS meeting held on 30 AUGUST for 2023-24)

STUDENT ACTIVITIES

UNIT I: ESSENTIALS OF MATHEMATICS:

1: Complex Number Exploration

Provide students with a set of complex numbers in both rectangular and polar forms. They

will plot the complex numbers on the complex plane and identify their properties 2:

Trigonometric Ratios Problem Solving

Give students a set of problems that require the calculation of trigonometric ratios and their relations.

Students will solve the problems using the appropriate trigonometric functions (sine, cosine, tangent, etc.) and trigonometric identities.

3: Vector Operations and Applications

Provide students with a set of vectors in Cartesian form.

Students will perform vector addition and subtraction operations to find the resultant vectors.

They will also calculate the scalar and vector products of given vectors.

4: Statistical Measures and Data Analysis

Give students a dataset containing numerical values.

Students will calculate the mean, median, and mode of the data, as well as other statistical measures if appropriate (e.g., range, standard deviation).
They will interpret the results and analyze the central tendencies and distribution of the data.

UNIT II: ESSENTIALS OF PHYSICS:

1. Concept Mapping

Divide students into groups and assign each group one of the topics.

Students will create a concept map illustrating the key concepts, relationships, and applications related to their assigned topic.

Encourage students to use visual elements, arrows, and labels to represent connections and interdependencies between concepts.

2. Laboratory Experiment

Select a laboratory experiment related to one of the topics, such as motion of objects or electric and magnetic fields.
Provide the necessary materials, instructions, and safety guidelines for conducting the experiment.
Students will work in small groups to carry out the experiment, collect data, and analyze the results.

After the experiment, students will write a lab report summarizing their findings, observations, and conclusions.

UNIT III: ESSENTIALS OF CHEMISTRY

1: Chemistry in Daily Life Presentation

Divide students into groups and assign each group a specific aspect of daily life where chemistry plays a significant role, such as food and nutrition, household products, medicine,or environmental issues.
Students will research and create a presentation (e.g., PowerPoint, poster, or video) that showcases the importance of chemistry in their assigned aspect.
2: Periodic Table Exploration

Provide students with a copy of the periodic table.

Students will explore the periodic table and its significance in organizing elements based on their properties.
They will identify and analyze trends in atomic structure, such as electronic configuration, atomic size, and ionization energy.

3: Chemical Changes and Classification of Matter

Provide students with various substances and chemical reactions, such as mixing acids and bases or observing a combustion reaction.
Students will observe and describe the chemical changes that occur, including changes in color, temperature, or the formation of new substances.
4: Biomolecules Investigation

Assign each student or group a specific biomolecule category, such as carbohydrates,proteins, fats, or vitamins.
Students will research and gather information about their assigned biomolecule category, including its structure, functions, sources, and importance in the human body.

They can create informative posters or presentations to present their findings to the class.

UNIT IV: APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY

1: Interdisciplinary Case Studies

Divide students into small groups and provide them with interdisciplinary case studies that involve the interdisciplinary application of mathematics, physics, and chemistry.

Each case study should present a real-world problem or scenario that requires the integration of concepts from all three disciplines.

2: Design and Innovation Project

Challenge students to design and develop a practical solution or innovation that integrates mathematics, physics, and chemistry principles.

Students can choose a specific problem or area of interest, such as renewable energy, environmental conservation, or materials science.

3: Laboratory Experiments

Assign students laboratory experiments that demonstrate the practical applications of Mathematics, physics, and chemistry.

Examples include investigating the relationship between concentration and reaction rate, analyzing the behavior of electrical circuits, or measuring the properties of materials.

.4: Mathematical Modeling

Present students with real-world problems that require mathematical modeling and analysis.

UNIT V: ESSENTIALS OF COMPUTER SCIENCE:

1. Identifying the attributes of network (Topology, service provider, IP address and bandwidth of your college network) and prepare a report covering network architecture.

2. Identify the types of malwares and required firewalls to provide security.

3. Latest Fraud techniques used by hackers**.**

MODEL QUESTION PAPER

B.Sc DEGREE EXAMINATIONS
SEMESTER – I
Course 1: ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL ANDCHEMICAL SCIENCES

Time: 2.30 Hrs. **Max.Marks:50**

SECTION-A

Answer any FIVE of the following: **5x7=35M**

1. **Question from Essentials of Mathematics.**

(OR)

2. **Question from Essentials of Mathematics.**
3. **Question from Essentials of Physics.**

(OR)

4. **Question from Essentials of Physics.**
5. **Question from Essentials of Chemsitry.**

(OR)

6. **Question from Essentials of Chemistry.**
7. **Question from Applications of Mathematics, Physics & Chemistry.**

(OR)

8. **Question from Applications of Mathematics, Physics & Chemistry.**
9. **Question from Essentials of Computer Science.**

(OR)

10. **Question from Essentials of Computer Science.**

SECTION-B

Answer any FIVE of the following: **5x3=15M**

11. **Question from Essentials of Mathematics.**
12. **Question from Essentials of Physics.**
13. **Question from Essentials of Chemistry**

14. Question from Essentials of Mathematics, Physics & Chemistry

15. Question from Essentials of Mathematics, Physics & Chemistry

16. Question from Essentials of Mathematics, Physics & Chemistry

17. Question from Essentials of Computer Science

18. Question from Essentials of Computer Science

	Government College (Autonomous) Rajahmundry (As Approved in the BOS meeting held on 30 AUGUST for 2023-24)	**Program & Semester** I B.Sc. (I Sem)			
Course Code ELE 002	**ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:		5	0	-	4

Course Objectives:

The objective of this course is to provide students with an in-depth understanding of the recent advances and cutting-edge research in mathematical, physical, and chemical sciences.

The course aims to broaden students' knowledge beyond the foundational concepts and expose them to the latest developments in these disciplines, fostering critical thinking, research skills, and the ability to contribute to scientific advancements.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Explore the applications of mathematics in various fields of physics and chemistry, to understand how mathematical concepts are used to model and solve real-world problems.
CO2	To Explain the basic principles and concepts underlying a broad range of fundamental areas of physics and to Connect their knowledge of physics to everyday situations.

CO3	Understand the different sources of renewable energy and their generation processes and advances in nanomaterials and their properties, with a focus on quantum dots. To study the emerging field of quantum communication and its potential applications. To gain an understanding of the principles of biophysics in studying biological systems. Explore the properties and applications of shape memory materials. Understand the principles and techniques used in computer-aided drug design and drug delivery systems, to understand the fabrication techniques and working principles of Nano sensors. Explore the effects of chemical pollutants on ecosystems and human health.
CO4	Understand the interplay and connections between mathematics, physics, and chemistry in various advanced applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.
CO5	Understand and convert between different number systems, such as binary, octal, decimal, and hexadecimal. Differentiate between analog and digital signals and understand their characteristics.Gain knowledge of different types of transmission media, such as wired (e.g., copper cables, fiber optics) and wireless (e.g., radio waves, microwave, satellite)..

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development			Employability			Entrepreneurship	

Syllabus:

UNIT I: ADVANCES IN BASICS MATHEMATICS

Straight Lines: Different forms – Reduction of general equation into various forms – Point ofintersection of two straight lines

Limits and Differentiation: Standard limits – Derivative of a function –Problems on product ruleand quotient rule

Integration: Integration as a reverse process of differentiation – Basic methods of integration

Matrices: Types of matrices – Scalar multiple of a matrix – Multiplication of matrices – Transpose ofa matrix and determinants

UNIT II: ADVANCES IN PHYSICS:

Renewable energy: Generation, energy storage, and energy-efficient materials and devices. **Recent advances in the field of nanotechnology**: Quantum dots, Quantum Communication- recent advances in biophysics- recent advances in medical physics- Shape Memory Materials.

UNIT III: ADVANCES IN CHEMISTRY:

Computer aided drug design and delivery, nano sensors, Chemical Biology, impact of chemical pollutants on ecosystems and human health, Dye removal - Catalysis method.

UNIT IV: ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY

Mathematical Modelling applications in physics and chemistry

Application of Renewable energy: Grid Integration and Smart Grids,

Application of nanotechnology: Nanomedicine,

Application of biophysics: Biophysical Imaging, Biomechanics, Neurophysics,

Application of medical physics: Radiation Therapy, Nuclear medicine

Solid waste management, Environmental remediation- Green Technology, Water treatment.

UNIT V: Advanced Applications of computer Science

Number System-Binary, Octal, decimal, and Hexadecimal, Signals-Analog, Digital, Modem, Codec, Multiplexing, Transmission media, error detection and correction- Parity check and CRC, Networking devices- Repeater, hub, bridge, switch, router, gateway.

Recommended books:

1. Coordinate Geometry by S.L.Lony, Arihant Publications

2. Calculus by Thomas and Finny, Pearson Publications

3. Matrices by A.R.Vasishtha and A.K.Vasishtha, Krishna Prakashan Media(P)Ltd.

4. "Renewable Energy: Power for a Sustainable Future" by Godfrey Boyle

5. "Energy Storage: A Nontechnical Guide" by Richard Baxter

6. "Nanotechnology: Principles and Applications" by Sulabha K. Kulkarni and Raghvendra A. Bohara

7. "Biophysics: An Introduction" by Rodney Cotterill

8. "Medical Physics: Imaging" by James G. Webster

9. "Shape Memory Alloys: Properties and Applications" by Dimitris C. Lagoudas

10. Nano materials and applications by M.N.Borah

11. Environmental Chemistry by Anil.K.D.E.

12. Digital Logic Design by Morris Mano

13. Data Communication & Networking by Bahrouz Forouzan.

Web Links:

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1													
CO2													
CO3													
CO4													
CO5													

STUDENT ACTIVITIES

UNIT I: ADVANCES IN BASIC MATHEMATICS

1: Straight Lines Exploration

Provide students with a set of equations representing straight lines in different forms, such as slope-intercept form, point-slope form, or general form.

Students will explore the properties and characteristics of straight lines, including their slopes, intercepts, and point of intersection.

2: Limits and Differentiation Problem Solving

Students will apply the concept of limits to solve various problems using standard limits.

Encourage students to interpret the results and make connections to real-world applications, such as analyzing rates of change or optimizing functions.

3: Integration Exploration

Students will explore the concept of integration as a reverse process of differentiation and apply basic methods of integration, such as the product rule, substitution method, or integration by parts.

Students can discuss the significance of integration in various fields, such as physics and chemistry

4: Matrices Manipulation

Students will perform operations on matrices, including scalar multiplication, matrix multiplication, and matrix transpose.

Students can apply their knowledge of matrices to real-world applications, such as solving systems of equations or representing transformations in geometry.

UNIT II: ADVANCES IN PHYSICS:

1: Case Studies

Provide students with real-world case studies related to renewable energy, nanotechnology, biophysics, medical physics, or shape memory materials.

Students will analyze the case studies, identify the challenges or problems presented, andpropose innovative solutions based on the recent advances in the respective field. They will consider factors such as energy generation, energy storage, efficiency, sustainability, materials design, biomedical applications, or technological advancements. 2: Experimental Design

Assign students to design and conduct experiments related to one of the topics: renewableenergy, nanotechnology, biophysics, medical physics, or shape memory materials.

They will identify a specific research question or problem to investigate and design anexperiment accordingly.

Students will collect and analyze data, interpret the results, and draw conclusions based ontheir findings.

They will discuss the implications of their experimental results in the context of recent advances in the field.

3: Group Discussion and Debate

Organize a group discussion or debate session where students will discuss the ethical, social, and environmental implications of the recent advances in renewable energy, nanotechnology,biophysics, medical physics, and shape memory materials.

Assign students specific roles, such as proponent, opponent, or moderator, and provide themwith key points and arguments to support their positions.

UNIT III: ADVANCES IN CHEMISTRY:

1. Experimental Design and Simulation

In small groups, students will design experiments or simulations related to the assigned topic.

For example, in the context of computer-aided drug design, students could design a virtual screening experiment to identify potential drug candidates for a specific disease target.

For nano sensors, students could design an experiment to demonstrate the sensitivity andselectivity of nano sensors in detecting specific analytes.

Chemical biology-related activities could involve designing experiments to study enzyme-substrate interactions or molecular interactions in biological systems.
Students will perform their experiments or simulations, collect data, analyze the results, anddraw conclusions based on their findings.

2. Case Studies and Discussion

Provide students with real-world case studies related to the impact of chemical pollutants onecosystems and human health.
Students will analyze the case studies, identify the sources and effects of chemical pollutants,and propose mitigation strategies to minimize their impact.

Encourage discussions on the ethical and environmental considerations when dealing withchemical pollutants.
For the dye removal using the catalysis method, students can explore case studies wherecatalytic processes are used to degrade or remove dyes from wastewater.

Students will discuss the principles of catalysis, the advantages and limitations of thecatalysis method, and its applications in environmental remediation.
3: Group Project

Assign students to work in groups to develop a project related to one of the topics.

The project could involve designing a computer-aided drug delivery system, developing a nano sensor for a specific application, or proposing strategies to mitigate the impact ofchemical pollutants on ecosystems.
Students will develop a detailed project plan, conduct experiments or simulations, analyzedata, and present their findings and recommendations.

Encourage creativity, critical thinking, and collaboration throughout the project.

UNIT IV: ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY

1: Mathematical Modelling Experiment

Provide students with a mathematical modelling experiment related to one of the topics. For example, in the context of renewable energy, students can develop a mathematical model tooptimize the placement and configuration of solar panels in a solar farm.

Students will work in teams to design and conduct the experiment, collect data, and analyzethe results using mathematical models and statistical techniques.
They will discuss the accuracy and limitations of their model, propose improvements, and interpret the implications of their findings in the context of renewable energy or the specificapplication area.
2: Case Studies and Group Discussions

Assign students to analyze case studies related to the applications of mathematical modellingin nanotechnology, biophysics, medical physics, solid waste management, environmental remediation, or water treatment.
Students will discuss the mathematical models and computational methods used in the case studies, analyze the outcomes, and evaluate the effectiveness of the modelling approach.
Encourage group discussions on the challenges, ethical considerations, and potentialadvancements in the field.

Students will present their findings and engage in critical discussions on the advantages andlimitations of mathematical modelling in solving complex problems in these areas.

1. Group Project

Assign students to work in groups to develop a group project that integrates mathematical modelling with one of the application areas: renewable energy, nanotechnology, biophysics, medical physics, solid waste management, environmental remediation, or water treatment.

The project could involve developing a mathematical model to optimize the delivery of radiation therapy in medical physics or designing a mathematical model to optimize wastemanagement practices.
Students will plan and execute their project, apply mathematical modelling techniques,analyze the results, and present their findings and recommendations. Encourage creativity, critical thinking, and collaboration throughout the project.

UNIT V: Advanced Applications of computer Science

Students must be able to convert numbers from other number system to binary number systems

1. Identify the networking media used for your college network

2. Identify all the networking devices used in your college premises.

MODEL QUESTION PAPER

B.Sc DEGREE EXAMINATIONS

SEMESTER – I

Course 2: ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

Time: 2.30 Hrs. **Max.Marks:50**

Section - A

Answer any Five questions. **5 X 7M = 35M**

1. **Question from Advances In Basics Mathematics**

(OR)

2. **Question from Advances In Basics Mathematics**

3. **Question from Advances In Physics**

(OR)

4. **Question from Advances In Physics**

5. **Question from Advances In Chemistry**

(OR)

6. **Question from Advances In Chemistry**

7. **Question from Advanced Applications of Mathematics, Physics & Chemistry**

(OR)

8. **Question from Advanced Applications of Mathematics, Physics & Chemistry**

9. **Question from Advanced Applications of computer Science**

(OR)

10. **Question from Advanced Applications of computer Science**

Section - B

Answer any Five questions. **5 X 3M =15M**

11. **Question from Advances In Basics Mathematics**
12. **Question from Advances In Physics**
13. **Question from Advances In Chemistry**
14. **Question from Advanced Applications of Mathematics, Physics & Chemistry**
15. **Question from Advanced Applications of Mathematics, Physics & Chemistry**

16. Question from Advanced Applications of Mathematics, Physics & Chemistry
17. Question from Advanced Applications of computer Science
18. Question from Advanced Applications of computer Science

	Government College (Autonomous) Rajahmundry (As Approved in the BOS meeting held on 30 AUGUST for 2023-24)	**Program & Semester** II B.Sc. (II Sem)			
Course Code **ELE 003**	**FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:		5	3	2	3+1

Course Objectives:

The students will learn:

1) Basics of electrostatics, Gauss theorem and its applications, concept of a capacitor, various types of capacitors and dielectric constant, magnetic effects of current, cells and the measuring instruments like ammeter and voltmeter.
2) Basics of p-n junction, rectifying action of a diode, regulated power supplies and wave shaping circuits.
3) Transistor and its three modes of operation, h-parameter model of a transistor and the frequency response of an amplifier.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Applications of Gauss law

CO2	Different types of capacitors and their combinations
CO3	Applications of Biot Savart law
CO4	Applications of Transistors
CO5	Construction and application of Basic logic gates

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development			Employability			Entrepreneurship	

Syllabus:

UNIT-I

Electrostatics: Electric charges - Coulomb's law - Electric field - Electric intensity and electric potential

- Relation between electric potential and intensity - Electric intensity and potential due to a uniform charged conducting sphere at a point outside, on, and inside the conductor.

Electric dipole - Dipole moment - Intensity and potential due to a dipole - Statement and proof of Gauss law - Application of Gauss law to uniformly charged solid sphere.

UNIT-II

Capacitors: Definition and unit of capacity - Capacitance of a parallel plate capacitor - Effect of dielectric on capacity - Capacitors in series and parallel - Energy stored in acharged capacitors - Loss of energy on sharing of charges between two capacitors - Force of attraction between plates of charged parallel plate capacitor - Kelvin's attracted disc electrometer - Measurement of potential and dielectric constant.

Type of capacitors - Mica capacitor, Electrolytic capacitors, Variable air capacitor - Uses of capacitors.

UNIT-III

Electrical Measurements: Carey-Foster bridge - Determination of specific resistance - Potentiometer - Calibration of low and high range voltmeters - Calibration of Low range ammeter.

Magnetic Effect of Current: Biot-Savart's law [Force on a conductor carrying current placed in a magnetic field - Principle, construction and theory of a moving coil ballistic galvanometer - Measurement of figure of merit of B.G. - Comparison of capacitors using B.G.

UNIT-IV

Diode circuits and power Supplies: Junction diode characteristics - Half and full wave rectifiers - Expression for efficiency and ripple factor - Construction of low range power peak using diodes - Bridge rectifier - Filter circuits - Zener Diode - Characteristics - Regulated power supply using Zener diode - Clipper and Clamper using diodes.
Differentiator and integrator using resistor and capacitor.

UNIT-V

Transistor circuits: Characteristics of a transistor in CB, CE modes - Relatively merits Graphical analysis in CE configuration - Transistor as a amplifier - RC coupled

Single stage amplifier - Frequency response - Thevenin's and Norton's theorems - h parameters.
Basis logic gates AND, OR, and NOT - Construction of basic logic gates using diodes and transistors.

Text books:

Electricity and Magnetism - *M. Narayanamoorthi and Others*, National PublishingCo., Chennai.
Electricity and Magnetism - *R. Murugeshan*, S. Chand & Co. Ltd., New Delhi,Revised Edition, 2006.
Principles of Electronics - *V.K. Mehta*, S. Chand & Co., 4/e, 2001.
Basic Electronics - *B.L. Theraja*, S. Chand & Co., 4/e, 2001.

Reference books:

Electricity and Magnetism - Brijlal & Subrahmanyam, Ratan Prakashan Mandir,Agra. Fundamentals of Electricity and Magnetism - B.D. Duggal & C.L. Chhabra, ShobanLal Nagin Chand & Co., Jallundur. Physics, Vol. II - Resnick, Halliday & Krane, 5/e, John Wiley & Sons, Inc.,. Basic Electronics - B. Grob, McGraw - hill, 6/e, NY, 1989.
Elements of Electronics - Bagde & Singh, S. Chand

Web Links:

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO 3	PO4	PO5	PO 6	PO7	PO 8	PO9	PO1 0	PSO 1	PSO 2	PSO 3
CO1													

CO2													
CO3													
CO4													
CO5													

MODEL QUESTION PAPER

B.Sc DEGREE EXAMINATIONS
SEMESTER – II
Course 3: FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS

Time: 2.30 Hrs.

Max.Marks:50

Section - A

Answer any five questions. **5 X 7M = 35M**

1. **Question from Unit – I**

(OR)

2. **Question from Unit – I**

3. **Question from Unit – II**

(OR)

4. **Question from Unit – II**

5. **Question from Unit – III**

(OR)

6. **Question from Unit – III**

7. **Question from Unit – IV**

(OR)

8. **Question from Unit – IV**

9. **Question from Unit – V**

(OR)

10. Question from Unit – V

Section - B

Answer any Five questions **5 X 3M =15M**

11. Question from Unit – I
12. Question from Unit – II
13. Question from Unit – III
14. Question from Unit – IV
15. Question from Unit – V
16. Question from Unit – III
17. Question from Unit – IV
18. Question from Unit – V

	Government College (Autonomous) Rajahmundry (As Approved in the BOS meeting held on 30 AUGUST for 2022-23)	**Program & Semester** II B.Sc. (II Sem)			
Course Code **ELE 004**	**CIRCUIT THEORY AND ELECTRONIC DEVICES**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:		3	0	-	3

Course Objectives:

To explain the basic concepts and laws of DC and AC electrical networks and solve them using mesh and nodal analysis techniques.
To analyze circuits in time and frequency domain.
To synthesize the networks using passive elements.
To understand the construction, working and VI characteristics of electronic devices.
To understand the concept of power supply.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Apply concepts of electric network topology, nodes, branches, loops to solve circuit problems including the use of computer simulation.
CO2	Apply time and frequency concepts of analysis.
CO3	Synthesize the network using passive elements.
CO4	Know about amplifier circuits, switching circuits and oscillator circuits their design and use in electronics.
CO5	Design and construction of a power supply.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

UNIT- 1:

SINUSOIDAL ALTERNATING WAVEFORMS:

Definition of current and voltage. The sine wave, general format of sine wave for voltage or current, phase relations, average value, effective (R.M.S) values. Differences between A.C and D.C. Phase relation of R,L and C

UNIT-II:

PASSIVE NETWORKS AND NETWORKS THEOREMS (D.C):

Branch current method, Nodal Analysis, star to delta & delta to star conversions. Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power, Milliman and Reciprocity theorems .

UNIT-III:

RC, RL AND RLC CIRCUITS:

Frequency response of RC and RL circuits, their action as low pass and high pass filters. Passive differentiating and integrating circuits. Series resonance and parallel resonance circuits, Q – Factor.

UNIT-IV:

BJT, FET and UJT:

BJT: Construction, working, and characteristics of CE Configurations. Hybrid parameters and hybrid equivalent circuit of CE Transistor,

FET: Construction, working and characteristics of JFET and MOSFET. Advantages of FET over BJT.

UJT: Construction, working and characteristics of UJT. UJT as a Relaxation oscillator.

UNIT-V:

POWER SUPPLIES & PHOTO ELECTRIC DEVICES

Rectifiers: Half wave, full wave rectifiers-Efficiency-ripple factor- Filters- L-section&π-section filters. Three terminal fixed voltage I.C.regulators (78XX and &79XX). Light Emitting Diode – Photo diode and LDR.

Text books:

1. Introductory circuit Analysis (UBS Publications) Robert L. Boylestad.

2. Electronic Devices and Circuit Theory Robert L. Boylestad & Louisashelsky.

3. Circuit Analysis by P.Gnanasivam- Pearson Education

4. Electronic Devices and Circuit Theory Robert L. Boylestad & Louis Nashelsky.

5. Electronic Devices and Circuits I – T.L.Floyd- PHI Fifth Edition

Reference books:

1. Engineering Circuit Analysis By: Hayt & Kemmerly - MG.

2. Networks and Systems – D.Roy Chowdary.

3. Unified Electronics (Circuit Analysis and Electronic Devices) byAgarwal- Arora

4. Electric Circuit Analysis- S.R. Paranjothi- New Age International.

5. Integrated Electronics – Millmam & Halkias.

6. Electronic Devices & Circuits – Bogart.

7. Sedha R.S., A Text Book Of Applied Electronics, S.Chand & Company Ltd

Web Links:

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2	PSO 3
CO1													
CO2													
CO3													
CO4													
CO5													

GOVERNMENT COLLEGE (A): RAJAMAHENDRAVARAM
DEPARTMENT OF ELECTRONICS
SYLLABUS FOR I B.Sc., ELECTRONICS
MODULE-IV [CIRCUIT THEORY AND ELECTRONIC DEVICES]
SEMESTER II
(As Approved in the BOS meeting held on 30 AUGUST for 2023-24)

Practical Credits: 1 2 hrs/week

1. Thevenin's Theorem-verification
2. Norton's Theorem-verification

3. Maximum Power Transfer Theorem-verification
4. LCR series resonance circuit.
5. BJT input and output characteristics
6. FET output and transfer characteristics
7. LDR characteristics
8. UJT VI Characteristics
9. IC regulated power supply(IC-7805)

Lab experiments are to be done on breadboard and simulation software (using multi sim) and output values are to be compared and justified for variation.

MODEL QUESTION PAPER
B.Sc DEGREE EXAMINATIONS
SEMESTER – II
Course 4: CIRCUIT THEORY AND ELECTRONIC DEVICES

Time: 2.30 Hrs. **Max.Marks:50**

Section - A

Answer any five questions. **5 X 7M = 35M**

1. **Question from Unit – I**

(OR)

2. **Question from Unit – I**

3. **Question from Unit – II**

(OR)

4. **Question from Unit – II**

5. **Question from Unit – III**

(OR)

6. **Question from Unit – III**

7. **Question from Unit – IV**

(OR)

8. **Question from Unit – IV**

9. **Question from Unit – V**

(OR)

10. **Question from Unit – V**

Section - B

Answer any Five questions **5 X 3M =15M**

11. **Question from Unit – I**
12. **Question from Unit – II**
13. **Question from Unit – III**
14. **Question from Unit – IV**
15. **Question from Unit – V**
16. **Question from Unit – III**
17. **Question from Unit – IV**
18. **Question from Unit – V**

SEMESTER-III

COURSE 5: SEMICONDUCTOR DEVICES AND MATERIALS

Theory Credits: 3 3 hrs/week

Objective:

1. To provide basic knowledge and concepts of Semiconductor materials and devices.
2. To facilitate students learn on the physical principles and operational characteristics of Semiconductor devices and some of its important applications. Pre-requisites: Basic understanding of semiconductors.

Outcomes:

- Ability to apply basic concepts of Inorganic and Organic Semiconductor materials forelectronic device application in modern electronic industry.
- Detailed knowledge of various classifications and applications to VLSI, LEDs and solarcells.
- Holistic view of the latest progress in two-dimensional (2D)-one-dimensional (1D) andnano materials.
- Emphasis on nano-electronic applications such as Schottky barrier transistors, flexibleElectronics.

Unit I:
Inorganic and Organic Semiconductor: Energy bands, carrier transport, mobility, drift-diffusivity, excess carrier, injection and recombination of the excess carriers, carrier statistics; High field effects: velocity saturation, hot carriers and avalanche breakdown.

Unit II:
Majority carrier Devices: MS contacts rectifier and non-rectifier, MIS structures, MESFET, hetero-junction, HEMT and band diagrams, I-V and C-V characteristics.

Unit III:
MOS structures: Semiconductor surfaces; The ideal and non-ideal MOS capacitor band diagrams and CVs; Effects of oxide charges, defects and interface states. MOSFET: Structures and Device Characteristics, Short-Channel effects. Charge coupled Devices (CCDs), application to VLSI.

Unit IV:
Nonvolatile Memory Device. Optoelectronic Devices: solar cell, photo detectors, LEDs, laser diodes. Nano structures and concepts: quantum wells, supper lattice structures, nanorod, quantum dot, CNTs, 2D materials: grapheme, BN, MoS_2 etc, matamaterials.

UNIT-V:
Multistage Amplifiers: BJT at high frequencies, frequency response of RC coupled amplifiers and transformer coupled amplifier.

Reference Books

1. Donald A. Neamen, Semiconductor Physics and Devices Basic Principles, 3rd edn.McGraw-Hil (2003)

2. B.G. Streetman and Sanjay Banerjee, Solid State Electronic Devices, 6th Edn., PrenticeHall, 2006.
3. S. M. Sze and Kwok K. Ng Physics of Semiconductor Devices, Wiley (2013).
4. M. Hussa, A. Dimoulas and A. Molle, 2D Materials for NanoElectronics, CRC press(2016)
5. M.S.Tyagi, Introduction to Semiconductor Materials and Devices, Willey, StudentEdition

SEMESTER-III

COURSE 5: SEMICONDUCTOR DEVICES AND MATERIALS

Practical Credits: 1 2 hrs/week

List of Experiments

1. To study the Hall Effect: determine the Hall coefficient, type of semiconductor andcarrier concentration in the given semiconductor sample.
2. To study the four probe method: calculate the resistivity and energy band gap of givensemiconductor sample.
3. To determine the resistivity of the given semiconductor specimen using Vander Pauwmethod.
4. To design a MOSFET as switching regulator for given duty cycle and plot the current-voltage (I-V) characteristic of MOSFET using Keithley.
5. To design a phase controlled rectifier using SCR and plot the I-V characteristic of SCRusing Keithley.
6. To design a relaxation oscillator using UJT and plot the I-V characteristic of UJT usingKeithley.
7. I-V characteristics measurement of a p-n diode/LEDs using Keithley - calculate itsideality factor.

SEMESTER-III
COURSE 6: DIGITAL ELECTRONICS

Theory Credits: 3 3 hrs/week

Objectives:

- To understand the number systems, Binary codes and Complements.
- To understand the Boolean algebra and simplification of Booleanexpressions.
- To analyze logic processes and implement logical operations usingcombinational logic circuits.
- To understand the concepts of sequential circuits and to analyzesequential systems in terms of state machines.
- To understands characteristics of memory and their classification.
- To implement combinational and sequential circuits using VHDL.

Unit – I

NUMBER SYSTEM AND CODES: Decimal, Binary, Hexadecimal, Octal. Codes: BCD, Gray and Excess-3 codes- code conversions- Complements (1's, 2's,9's and 10's), Addition -Subtraction using complement methods.

Unit- II

BOOLEAN ALGEBRA AND THEOREMS: Boolean Theorems, De-Morgan's laws. Digital logic gates, Multi level NAND & NOR gates. Standard representation of logic functions (SOPand POS), Minimization Techniques (Karnaugh Map Method: 2,3 variables).

Unit-III

COMBINATIONAL DIGITAL CIRCUITS:

Adders-Half & full adder, Subtractor-Half and full subtractors, Parallel binary adder, Magnitude Comparator, Multiplexers (4:1)) and Demultiplexers (1:4), Encoder (8-line-to-3- line) and Decoder (3-line-to-8-line). IC-LOGIC FAMILIES: TTL logic, CMOS Logic families(NAND&NOR Gates).

UNIT-IV

SEQUENTIAL DIGITAL CIRCUITS:

Flip Flops: S-R FF , J-K FF, T and D type FFs, Master-Slave FFs, Excitation tables, Registers:- Serial In Serial Out and Parallel In and Parallel Out, Counters Asynchronous-,Mod-8,Mod- 10,Synchronous-4-bit &Ring counter.

UNIT-V

MEMORY DEVICES:

General Memory Operations, ROM, RAM (Static and Dynamic), PROM, EPROM, EEPROM,EAROM

TEXT BOOKS:

1. M.Morris Mano, " Digital Design " 3rd Edition, PHI, New Delhi.
2. Ronald J. Tocci. "Digital Systems-Principles and Applications" 6/e. PHI.New Delhi. 1999.(UNITS I to IV)
3. G.K.Kharate-Digital electronics-oxford universitypress
4. S.Salivahana&S.Arivazhagan-Digital circuits and design
5. Fundamentals of Digital Circuits by Anand Kumar

Reference Books :

1. Herbert Taub and Donald Schilling. "Digital Integrated Electronics" .McGraw Hill. 1985.
2. S.K. Bose. "Digital Systems". 2/e. New Age International. 1992.
3. D.K. Anvekar and B.S. Sonade. "Electronic Data Converters :Fundamentals & Applications". TMH. 1994.
4. *Malvino and Leach. " Digital Principles and Applications". TMG Hill Edition.*

Outcomes:-

- ✔ Develop a digital logic and apply it to solve real life problems.
- ✔ Analyze, design and implement combinational logic circuits.
- ✔ Classify different semiconductor memories.
- ✔ Analyze, design and implement sequential logic circuits.
- ✔ Simulate and implement combinational and sequential logic circuits usingVHDL

SEMESTER – III
COURSE 6: DIGITAL ELECTRONICS

Practical Credits: 1 2 hrs/week

LAB LIST:

1. Verification of IC-logic gates
2. Realization of basic gates using discrete components (resistor, diodes & transistor)
3. Realization of basic gates using Universal gates (NAND & NOR gates)
4. Verify Half adder and full adder using gates
5. Verify Half subtractor and full subtractor using gates.
6. Verify the truth table Multiplexer and demultiplexer.
5. Verify the truth table Encoder and decoder.
6. Verify the truth table of RS , JK, T-F/F using NAND gates
7. 4-bit binary parallel adder and subtractor using IC 7483
8. BCD to Seven Segment Decoder using IC -7447/7448

SEMESTER – III
COURSE 7: ANALOG ELECTRONICS

Theory Credits: 4 5 hrs/week

Objectives:

1. The design and working of RC coupled amplifiers, transformer coupled amplifiers and power amplifiers,

2. The concept of negative and positive feedback,

3. Pulse shaping and Schmitt trigger, and

4. The op-amp characteristics, frequency response and its linear and non-linear applications.

UNIT-I

Amplifiers: General principles of small signal amplifiers - Classifications - RC Coupled amplifiers - Gain - Frequency response - Input and output impedance - Multistage amplifiers - Transformer coupled amplifiers - Equivalent circuits at low, medium and high frequencies – Emitter follower.

Class A and Class B power amplifiers - Single ended and push-pull configurations - Power dissipation and output power calculations.

UNIT-II

Feedback Amplifiers: Basic concept of feedback amplifiers - Transfer gain with feedback - General characteristics of negative feedback amplifier - Effect of negative feedback on gain - Gain stability - Distortion and bandwidth - Input and output resistance in the case of various types of feedback - Analysis of voltage and current in feedback amplifier circuits.

UNIT-III

Operational Amplifiers: Principles - Transfer characteristics - Various offset parameters - Differential gain - CMRR - Slew rate – Bandwi

UNIT-IV

Op-amp Circuits: Basic operational amplifier circuits under inverting and non- inverting modes - Adder - Subtractor - Integrator - Differentiator - Comparator - Sine, square and triangular waveform generators - Active filters - Sample and Hold circuits.

UNIT-V

Oscillators: Positive feedback - Stability issues - Feedback requirement of oscillations -

Barkhausen criterion for oscillation - Hartley, Colpitts, Phase shift and Wien bridge oscillators - Condition for oscillation and frequency derivation - Crystal oscillator - UJT relaxation oscillator. Monostable, bistable and astable multivibrators - Schmitt trigger.

Text Books

1. Introduction to Integrated Electronics - *V. Vijayendran*, S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai, 2005.
2. Electronic Circuits and Systems - *Y.N. Bapat*, Tata McGraw Hill Publishing Co. Ltd.

Reference Books

1. Electronic Devices and Circuits - *G.K. Mithal*, Khanna Publishers, Delhi.
2. Hand Book of Electronics - *Gupta & Kumar*, Pragati Prakashan, Meerut.
3. Electronic Devices and Circuit Theory - *R. Boylestad & L. Nashelsky*, Prentice Hallof India Private Limited, 6/e.
4. Electronic Devices and Circuits - *J.P. Agarwal & Amit Agarwal*, PrakasamPublishers.

5. Linear Integrated Circuits - *D. Roy Choudhury & Shail Jain*, New Age International (P) Limited.

SEMESTER-III
COURSE 8: ELECTRONIC COMMUNICATION SYSTEMS

Theory Credits: 3 3 hrs/week

The students will learn :

a. fundamentals of antenna, their characteristics and types,

b. amplitude modulation and demodulation and radio wave transmission andreception,

frequency modulation and demodulation and FM radio wave transmission andreception,

d. Principle of analog and digital pulse modulation and their applications,

e. transmission and detection of digital signals.

UNIT-I

Antenna - Effective resistance - Efficiency - Directive gain - Bandwidth, Beam

widthand polarization - Dipole - Folded dipole - Arrays - Yagi - Uda - Helical - Discone - Parabolic - Dish Antennas - Ground wave, sky wave and space ware propagation - Skip distance - Maximum usable frequency.

UNIT-II

Modulation - Needs for Modulation - Types of Modulation - Amplitude Modulation - Generation and detections circuits - Balanced Modulator - DSB/SC and SSB Modulation - VSB modulation. Block diagram of AM Radio transmitter and super heterodyne Receiver.

UNIT-III

Frequency Modulation - Definition - Derivation of Modulated wave - Generation of FM - Varactor diode and Reactance tube Modulators - Detectors - Balanced slope detector, Foster Seeley discriminator, ratio detector - Block diagram of FM transmitter and receiver.

UNIT-IV

Pulse Modulation - Sampling theorem - PAM, PWM, , PCM - quantizing, sampling, coding, decoding, quantization error, delta modulation and adaptive delta modulation.

UNIT-V

Multiplexing - FDM, TDM, CDMA - ASK, FSK, PSK –Advantages of DigitalCommunication - Introduction to Microwave, Fiber optic, Satellite Communications - RADAR - range equation.

Text Books

Electronic Communication Systems - *George Kennedy*, McGraw Hill BookCompany, 4/e, 2005.

2. Communication Engineering - *T.G. Palanivelu*, Anuradha Publicatons, 1/e, 2002.

Reference Books

1. Communication System - *Roddy & Coolen*, 4/e, Pearson Education, 2005.

Principles of Communication Engineering - *Anok Singh*, 4/e,

SathyaprakasamPublications, 2004.

3. Electronic Communication Systems *Wayne Tomasi*, 4/e, Pearson Education, 2004.

SEMESTER-IV

COURSE 9: ELECTRICAL AND ELECTRONIC INSTRUMENTATION

Theory Credits: 4 5 hrs/week

The students will learn:

Basic concepts of indicating instruments.

Various electronic instruments such as CRO,

Storage oscilloscopes, function generators,

Spectrum analyzer etc.,

Transducers, sensors and display devices.

UNIT-I

DC and AC indicating Instruments: Accuracy and precision - Types of errors - PMMC galvanometer, sensitivity, Loading effect - Conversion of Galvanometer into ammeter, Voltmeter and Shunt type ohmmeter- Multimeter.

Electrodynamometer - Thermocouple instrument - Electrostatic voltmeter - Watt- hour meter.

UNIT-II

DC and AC bridges: Wheatstone bridge - Kelvin's bridge - Balancing condition for AC bridge - Maxwell's bridge - Schering's bridge - Wein's bridge - Determination of frequency.

UNIT-III

Oscilloscopes: Block diagram - Deflection Sensitivity - Electrostatic Deflection - Electrostatic Focusing - CRT Screen - Measurement of Waveform frequency, phase difference and Time intervals - Sampling Oscilloscope - Analog and Digital Storage Oscilloscopes.

UNIT-IV

Instrumentation Amplifiers and Signal Analysers: Instrumentation amplifier - Electronic Voltmeter and Multimeter - Digital Voltmeter - Function Generator - Wave Analyser - Fundamentals of Spectrum Analyser.

UNIT-V

Transducer and Display Devices: Strain Gauge - Unbounded Strain Gauge - LVDT - Resistance Thermometer - Photoelectric Transducer - Pen Recorder - Audio Tape Recorder - Seven Segment Display - LCD.

Text Books

1. Electronic Instrumentation and Measurement Techniques - W.D. Cooper & A.D. Helfrick, Prentice Hall of India.
2. Electronic Instrumentation and Measurement - Kalasi.

Reference Books

1. A Course in Electrical and Electronic Measurement and Instrumentation - A.K. Sawhney, Dhanpat Rai and Sons.
2. Electronic Instrumentation and Measurements - P.B. Zbar, Mc Graw Hill International.

3. Measurement Systems Application and Design - Ernest O. Doebelin, 4/e, TataMcGraw Hill Publishing Co. LTD

SEMESTER-IV
COURSE 10: MICRO CONTROLLER SYSTEM

Theory Credits: 3 3 hrs/week

OBJECTIVES:

- To understand the concepts of microcontroller based system.

- To enable design and programming of microcontroller based system.
- To know about the interfacing Circuits.

UNIT-I: (10Hrs) Introduction, comparison of Microprocessor and micro controller, Evolution of microcontrollers from 4-bit to 32 bit , Development tools for micro controllers, Assembler-Compiler-Simulator/Debugger.

UNIT -II: (10Hrs)

Microcontroller Architecture: Overview and block diagram of 8051, Architecture of 8051, program counter and memory organization, Data types and directives, PSW register, Registerbanks and stack, pin diagram of 8051, Port organization, Interrupts and timers.

UNIT-III:(10Hrs)

Addressing modes, instruction set of 8051: Addressing modes and accessing memory usingvarious addressing modes, instruction set: Arithmetic, Logical, Simple bit, jump, loop and call instructions and their usage. Time delay generation and calculation, Timer/Counter Programming,

Unit -IV: (15Hrs)

Assemble language programming Examples: Addition, Multiplication, Subtraction, division, arranging a given set of numbers in largest/smallest order.

UNIT-V : (15Hrs)

Interfacing and Application of Microcontroller: Interfacing of – PPI 8255, DAC (0804), Temperature measurement (LM35), interfacing seven segment displays, displaying information on a LCD, control of a stepper Motor (Uni-Polar)

TEXT BOOKS:

1. The 8051 microcontroller and embedded systems using assembly and c- kennet j. Ayalam,Dhananjay V. gadre, cengage publishers

2. The 8051 microcontrollers and Embedded systems - By Muhammad Ali Mazidi and JaniceGillispie Mazidi – Pearson Education Asia, 4th Reprint, 2002.

REFERENCE BOOKS:

1. Microcontrollers Architecture Programming, Interfacing and System Design – Rajkamal.
2. The 8051 Microcontroller Architecture, Programming and Application - Kenneth J.Ajala , west publishing company (ST PAUL, NEW YORK, LOS ANGELES, SAN FRANCISCO).
3. Microcontroller theory and application-Ajay V. Deshmukh

OUTCOMES:

- The student can gain good knowledge on microcontrollers and implement in practical applications
- learn Interfacing of Microcontroller
- get familiar with real time operating system

SEMESTER-IV
COURSE 10: MICRO CONTROLLER SYSTEM

Practical Credits: 1 2 hrs/week

LAB LIST:

1. Addition And Subtraction Of Two 8-Bit Numbers.
2. Multiplication And Division Of Two 8-Bit Numbers.
3. Largest number /smallest in an array.
4. Exchange Of Higher And Lower Nibbles In Accumulator.
5. Addition Of Two 8-Bit Numbers (Keil Software).
6. Addition Of Two 16-Bt Numbers (Keil Software)
7. Subtraction Of Two 8-Bit Numbers (Keil Software).
8. Subtraction Of Two 16-Bit Numbers (Keil Software).
9. Multiplication Of Two 8-Bit Numbers (Keil Software).
12. Program For Swapping And Compliment Of 8-Bit Numbers (Keil Software).
13. Program To Find The Largest Number In Given Array (Keil Software).
14. Program To Find The Smallest Number In Given Array (Keil Software).
15. Interfacing Led To 8051 Microcontroller (Keil Software).
16. Interfacing Buzzer To 8051 Microcontroller (Keil Software).
17. Interfacing Relay To 8051 Microcontroller (Keil Software).

Interfacing Seven Segments To 8051 Microcontroller

SEMESTER-IV
COURSE 11: MICROPROCESSOR SYSTEMS

Theory Credits: 3 3 hrs/week

OBJECTIVES:

- To understand basic architecture of 16 bit and 32 bit microprocessors.
- To understand interfacing of 16 bit microprocessor with memory and peripheral chips involving system design.
- To understand techniques for faster execution of instructions and improve speed of operation and performance of microprocessors
- To understand RISC based microprocessors.
- To understand concept of multi core processors.

UNIT -I:

CPU ARCHITECTURE Introduction to Microprocessor, INTEL -8085(P) Architecture, CPU, ALU unit, Registerorganization, Address, data and control Buses. Pin configuration of 8085. Addressing modes 8086 Microprocessor: Architecture, Pin description. Instruction format, Instruction Executiontiming, Addressing modes

UNIT -II:

8085 Instruction Set:

Data transfer Instruction, Logical Instructions, Arithmetic Instructions, Branch Instructions,Machine Control instructions.

UNIT -III:

Assembly Language Programming using 8085, Programmes for Addition, Subtraction, Multiplication,Division, largest and smallest number in an array. BCD to ASCII and ASCIIto BCD.

UNIT -IV:

Basic 8086 Configurations – Minimum mode and Maximum Mode, Interrupt Priority Management I/O Interfaces: Serial Communication interfaces, Parallel Communication, Programmable Timers, Keyboard and display, DMA controller

UNIT -V:

ARM PROCESSOR: Introduction to 16/32 bit processors, Arm architecture &

organization, Arm based MCUs, Programming model, Instruction set.

TEXTBOOKS:

1. Microprocessor Architecture, Programming and Applications
2. with the 8085 – PenramInternational Publishing, Mumbai.- Ramesh S. Gaonakar
3. Microcomputer Systems the 8086/8088 family – YU-Cheng Liu and Glenn SA Gibson
4. Microcontrollers Architecture Programming, Interfacing and System Design

– Raj Kamal Chapter: 15.1, 15.2, 15.3, 15.4.1

4. 8086 and 8088 Microprocessor by Tribel and avatar singh

REFERENCES:

1. Microprocessors and Interfacing – Douglas V.Hall
2. Microprocessor and Digital Systems – Douglas V. Hall
3. Advanced Microprocessors & Microcontrollers - B.P.Singh & Renu Singh – New Age
4. The Intel Microprocessors – Architecture, Programming and Interfacing – Bary B.Brey.
5. Arm Architecture reference manual –Arm ltd.

OUTCOMES:

- The student can gain good knowledge on microprocessor and implement in practicalapplications
- Design system using memory chips and peripheral chips for 16 bit 8086microprocessor.
- Understand and devise techniques for faster execution of instructions, improve speedof operations and enhance performance of microprocessors.
- Understand multi core processor and its advantages

SEMESTER-IV

COURSE 11: MICROPROCESSOR SYSTEMS

Practical Credits: 1 2 hrs/week

List of Experiments

Programs using Intel 8085 /8086

1. Addition and Subtraction (8 bit and 16-bit)
2. Multiplication and Divition (8-bit)
3. Largest number in an array.
4. Smallest number in an array.
5. BCD to ASCII and ASCII to BCD .
6. Program To Convert Two Bcd Numbers In To Hex
7. Program To Convert Hex Number In To Bcd Number.
8. Program To Find The Square Root Of A Given Number.
9. Interfacing Experiments Using 8086 Microprocessor (Demo):

1. Traffic Light Controller
2. Elevator,
3. 7-Segment Display

SEMESTER-V

COURSE 12: CELLULAR MOBILE COMMUNICATION

Theory Credits: 4 5 hrs/week

The students will learn:

a. basics of digital cellular system, cordless telephony and cell structure

b. GSM wireless protocol and markup language fundamentals

c. basics of WLL and Bluetooth technology

UNIT-I

Advanced mobile phone service - Global system for mobile communication - Digital cellular system -

Cordless telephony - Third generation wireless systems.

UNIT-II

7 Cell structure - Hand off - roaming management - Hand off detection - Channel assignment techniques - Interference - ACI, CCI - Intersystem hand off and authentication - Network signaling - Cellular digital packet data

UNIT-III

GSM - Network signaling, mobility management, short message service - International

roaming, administration and operation.

UNIT-IV

Wireless application protocol - Architecture - Datagram - Transport layer securities - Transaction protocol - Session protocol application environment, wireless markup language, WML - Script wireless telephony applications.

UNIT-V

Third generation mobile services - Wireless local loop - Bluetooth technology.

Text Books

1. Mobile Communications - *Jochen Schiller*, 7/e, Pearson Education, 2003.

Principles of Wireless Networks - *Kauch Pahalavan & Prahanet Krishnamoorthy*,2/e, Pearson Education, 2004.

Reference Books

Wireless and Mobile Networks Architecture - *Yi-Bing Lin & Imnch Chlantee*, JohnWiley, 2001.

2. Wireless and Mobile Communication - *Rapparport*, Pearson Education, 2001.

SEMESTER-V

COURSE 13: COMPUTER NETWORK

Theory Credits: 4 5 hrs/week

Objective

The students will learn:

Provides a general introduction to computer networking that would be useful toall personnel who deal with distributed systems,

Encompassing both technical and managerial aspects.

To help students better understand the challenges and opportunities faced by modern business, topics include LAN and WAN implementations, the Internet and internet applications.

UNIT-I

Network structure Point to Point, Broadcast, Multicast - Horizontal and vertical distribution - Star, Mesh, tree, bus structures - OSI 7 layer model - Architecture - Functions of layers - Packet switches, circuit switching and message switching.

UNIT-II

Physical layer - Transmission media - Channel allocation methods - ALOHA, S- ALOHA, FINITE ALOHA - LAN Protocols IEEE802.3, 802.4, 802.5, 802.6 and 802.11.

UNIT-III

Data link layer - Framing - Error detection - Error correction - CRC - Stop and wait - Go band N - Sliding window Protocol - Selective repeat.

UNIT-IV

Network layer - Routing algorithms and congestion control algorithms - Repeaters, Bridges, Routers and Gateways, Inter networking - Introduction to transport layer and session layer.

UNIT-V

Presentation layer - coding, compression and cryptography - Introduction to Application layer - High performance networks - ATM, Fast Ethernet, FDDI, DQDB, SONET and SDH.

Text Books

1. Computer Networks - Andrew S. Tanenbaum, 4/e, Pearson Education, 2005.
2. Data and Computer Communication - W. Stallings, 7/e, Pearson Education, 2006.

Reference Books

1. Introduction to Data Communications and Networking - Behrouz & Forouzan,4/e, McGraw Hill Book Company, 2004.
2. Telecommunication Networks - Protocols Modeling and Analysis - Misha Stewartz,2/e, Pearson Education, 2002.

SEMESTER-V
COURSE 14 A: INDUSTRIAL ELECTRONICS

Theory Credits: 3 3 hrs/week

Note-1: For Semester–V, for the domain subject Electronics, any one of the above three pairs of SECs shall be chosen as courses 6 and 7, i.e., 6A & 7A or 6B & 7B or 6C & 7C. The pair shall not be broken (A, B, C allotment is random, not on any priority basis).

Note-2: One of the main objectives of Skill Enhancement Courses (SEC) is to inculcate skills related to the domain subject in students. The syllabus of SEC will be partially skill oriented. Hence, teachers shall also impart practical training to students on the skills embedded in syllabus citing related real field situations.

I. Learning Outcomes: Students after successful completion of the course will be able to:

1. Identify various facilities required to set up a basic Instrumentation Laboratory.
2. Acquire a critical knowledge of various Electrical Instruments used in the Laboratory.
3. Demonstrate skills of using instruments like Rectifiers, Multimeter, Power

supplies, Voltage Regulators etc. through hands on experience.

4. Understand the Principle and operation of different Electronic Heating devices.

Syllabus:

UNIT-I (20 hours)

Rectifiers and filters: Rectifiers– Half wave, full wave and bridge rectifiers- Efficiency- Ripple factor- Regulation – Harmonic components in rectified output – Types of filters- Choke input (inductor) filter- Shunt capacitor filter- π section and section filters.

Voltage Regulators: Transistor Series voltage regulator - Transistor Shunt voltage regulator – Three terminal regulators (78XX and 79XX).

UNIT-II (10 hours)

Power Supplies: Block diagram of regulated power supply – A simple regulated transistorized power supply (circuit and working) – Principle and working of switch mode power supply (SMPS).

UNIT-III (10 hours)

Voltage Multipliers: Half wave voltage doubler, Full wavevoltage doubler, Voltage Tripler circuit diagramand working mentioning of applications of voltage multipliers.

UNIT-IV (10 hours)

Controlled rectifiers: SCR Half wave rectifier circuit, working with wave forms, mathematical analysis for resistive load - SCR Full wave rectifier circuit, working with wave forms, mathematical analysis for resistive load – SCR as inverter parallel and series circuits.

UNIT-V (10 hours)

Heat effects: Resistance, inductance and dielectric heating. Principle of operations and its applications.

Reference Books:

1. Unified Electronics Volume II by J.P Agarwal and Amit Agarwal.
2. Industrial Electronics, S.B. Biswas, Dhanapur Rai & Sons.
3. Industrial Electronics, G.K. Mithal, Khanna Publishers.
4. Electronic Devices and Circuits – G.K. Mithal.
5. Electronic Devices and Circuits-Millman and Halkias- Tata Mc Graw Hill (TMH)
6. Microelectronics- J. Millman and A. Grabel – TMH

SEMESTER-V

COURSE 14 A: INDUSTRIAL ELECTRONICS

Practical Credits: 1 2 hrs/week

(ANY SIX EXPERIMEMTS SHOULD BE DONE)

1. D.C Power supply and filters.
2. Transistor series regulator
3. Transistor as a shunt regulator
4. Voltage regulator using IC-7805and IC-7905.
5. Voltage doubler using diodes
6. Voltage Tripler using diodes
7. SCR VI characteristics.
8. SCR Series inverter
9. SCR parallel inverter.

SEMESTER-V

COURSE 15 A: DIGITAL SYSTEM DESIGN

Theory Credits: 3 3 hrs/week

a. the fundamentals of Boolean algebra and simplification of Boolean functions
b. the combinational logic circuits and their design using HDL
c. the sequential logic circuits and their design using HDL

UNIT-I

Boolean Algebra and Logic Gates: Review of binary number systems - Binary

arithmetic - Binary codes - Boolean Algebra and theorems - Boolean functions - Simplifications of Boolean functions using Karnaugh map and tabulation methods - Logic gates.

UNIT-II

Combinational Logic: Combinational circuits - Analysis and design procedures - Circuits for arithmetic operations - Code conversions - Introduction to Hardware Description Language (HDL).

UNIT-III

Design with MSI Devices: Decoders and Encoders - Multiplexers and Demultiplexers - Memory and programming logic - HDL for combinational circuits.

UNIT-IV

Synchronous Sequential Logic: Sequential circuits - Flip-flops - Analysis and design procedures - State r eduction and state assignments - Shift registers - Counters - HDLfor sequential logic circuits, shift registers and counters.

UNIT-V

Asynchronous Sequential Logic: Analysis and design of asynchronous sequential circuits - Reduction of state and flow tables - Race free state assignment - Hazards.

Text Books

1. Digital Logic and Computer Design - *M. Morris Mano,* Prentice Hall of IndiaPrivate Limited.

2. A Verilog HDL Premier - *J. Baskar,* Pearson Education.

Reference Books

1. Analysis and Modeling of Digital Systems - *Zain Allabedin Navabee,* 2/e , McGrawHill Publishing Co. Ltd., New Delhi.

2. An Engineering Approach to Digital Design - *Fletcher*, Prentice Hall of IndiaPrivate Limited.

3. Modern Digital Electronics - *R.P. Jain*, 2/e, Tata McGraw Hill Publishing Co. Ltd.,New Delhi.

4. Digital Fundamentals - *T.L. Floyd*, 8/e, Pearson Education.

Co-Curricular Activities

(a) Mandatory: (*Training of students by teacher in field related skills: (lab:10 + field:05*)

1. For Teacher: Training of students by the teacher in the in the laboratory/fieldfor not less than 15 hours on the field techniques/skills of understanding the operation, Maintenance and utility of various electrical and electronic instruments both in the Laboratory as well as in daily life.

For Student: Students shall (individually)visit a local electrical and electronics shop or small firm to familiarize with the various electrical and electronic instruments available in the market and also to understand their functionality, principle of operation and applications as well as the troubleshooting of these instruments.(Or) Student shall visit a diagnostic centre and observe the ECG machine and the ECG pattern(Or) Student shall visit a diagnostic centre and observe the CT scan and MRI scan.(Or) Student shallvisit a mobile smart phone repair shop and observe the different components on the PCB(Motherboard), different ICs (chips) used in the motherboard and trouble shootingof touch screen in smart phones.

Observations shall be recorded in a hand-written Fieldwork/Project work not exceeding10 pages in the given format to be submitted to the teacher.

2. Max marks for Fieldwork/Project work: 05.

3. Suggested Format for Fieldwork/Project work: *Title page, student details, indexpage, details of place visited, observations, findings and acknowledgements*.

4. Unit tests (IE)

Suggested Co-Curricular Activities

1. Training of students by related industrial / technical experts.
2. Assignments (including technical assignments like identifying different measuring instruments and tools and their handling, operational techniqueswith safety and security.
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Making your own stethoscope at home.
5. Making seven segment display at home.

6. Preparation of videos on tools and techniques in various branches of instrumentation.
7. Collection of material/figures/photos related to products of Measuring Instruments, Display Modules and Biomedical Instruments and arrange them in
a systematic way in a file.
8. Visits to Instrumentation Laboratories of local Universities or Industries like Cement, Chemical or Sugar Plants etc. or any nearby research organizations, private firms, etc.
9. Invited lectures and presentations on related topics by Technical /industrial experts

SEMESTER-V

COURSE 14 B: EMBEDDED SYSTEMS DESIGN

Theory Credits: 4 5 Hrs/Week

UNIT 1: (15Hrs)

Introduction to Embedded Systems:

Embedded systems overview, Design Challenge, Processor Technology, IC Technology, and Design Technology.

UNIT 2: (15Hrs)

Custom Single Purpose Processor – Hardware Development: Introduction, Combinational logic,Sequential logic, Custom Single Purpose Processor Design, RT-Level Custom Single-Purpose Processor.

UNIT 3: (15Hrs)

General Purpose Processor – Software Development: Introduction, Basic Architecture, Operation, Programmer's View, ASIPs, and Development Environment: Host and Target Machines, Linker / Locators for Embedded Software, Getting Embedded Software into the target system. Debugging Techniques: Testing on your Host Machine, and Instruction Set Simulators.

UNIT 4: (10Hrs)

RTWA for Embedded Systems: Introduction, Timers, Counters and Watchdog Timers, UART, Pulse Width Modulators, LCD Controllers, Keypad Controllers, Stepper Motor Controllers, Analog – to – Digital Converters, and Real Time Clocks.

UNIT 5: (10Hrs)

Advanced Communication Principles: Parallel Communication, Serial Communication, Wireless Communication, Serial Protocols: I^2C, CAN, FireWire, and USB. Parallel Protocols: PCI BUS and ARM BUS. Wireless Protocols: IrDA, Bluetooth, and IEEE 802.11.

TEXT BOOKS:

1. Embedded System Design – A Unified Hardware / Software Introduction By Frank Vahid /Tony Givargis – WILEY EDITION.
2. Embedded Systems Architecture, Programming and Design – 2nd Edition By Raj Kamal –Tata McGraw-Hill Education.

REFERENCES:

1. An Embedded Software Premier - David E- Siman, PEARSON
2. Education Embedded / real - time systems - DR. K.V.K.K. Prasad,dreamtech
3. The art of programming Embedded systems, Jack G. Ganssle, academicpress
4. Intelligent Embedded systems, Louis L. Odette, Adison Wesly, 1991

SEMESTER-V
COURSE 15 B: CONSUMER ELECTRONICS

Theory Credits: 3 3 Hrs/Week

Learning Outcomes:

- To study Microwave ovens – block diagram - working - types – wiring and safetyinstructions. – care and cleaning
- To study washing machines – block diagram - working - types – wiring and safetyinstructions. – care and cleaning
- To study Air conditioners and refrigerators – block diagram - working - types – wiringand safety instructions. – care and cleaning
- To study Home/Office digital devices – block diagram - working - types – wiring andsafety instructions. – care and cleaning
- To study Digital access devices like – block diagram - working - types – wiring andsafety instructions. – care and cleaning

Unit – I

Microwave Ovens – Microwaves (Range used in Microwave ovens) – Microwave oven block diagram – LCD timer with alarm – Single-Chip Controllers – types of Microwave oven – Wiring and Safety instructions – care and Cleaning.

Unit – II

Washing Machines – Electronic controller for washing machines – Washing machine hardware and software – Types of washing machines – Fuzzy logic washing machines Featuresof washing machines.

Unit – III

Air Conditioners And Refrigerators - Air Conditioning – Components of air conditioning systems – All water air conditioning systems – All air conditioning systems – Unitary and central air conditioning systems – Split air conditioners.

Unit – IV

Home/Office Digital Devices – Fascimile machine – Xerographic copier – calculators – Structure of a calculator – Internal organization of a calculator – Servicing electronic calculators – Digital clocks – Block diagram of a digital clock.

Unit – V

Digital Access Devices – Digital computer – Internet access – online ticket reservation – functions and networks – barcode scanner and decoder – Electronic Fund Transfer – Automated Teller Machines(ATMs) – Set-Top boxes – Digital cable TV – Video on demand.

TEXTBOKS:

1. S.P. Bali, Consumer Electronics – Pearson Education, New Delhi,2005.

2. R.G. Gupta Audio and Video systems Tata McGraw Hill (2004)

Learning outcomes:

- The Student can gain good knowledge on microwave ovens and implement inpractical applications.
- The Student can gain good knowledge on Washing Machines and implementing practical applications.
- The Student can gain good knowledge on Air conditioners and Refrigerators and implement in practical applications.
- The Student can gain good knowledge on Digital access devices and implementing practical applications.
- Ability to measure strain, displacement, velocity, angular velocity , temperature, pressure Vacuum, and Flow.

SEMESTER V

COURSE 15 B: CONSUMER ELECTRONICS

Practical Credits: 1 2 hrs/week

(At least two Activities should be done)

1. Study of PA systems for various situations – Public gathering , closed theatre/ Auditorium, Conference room, Prepare Bill of Material(Costing)
2. Installation of Audio/Video systems – site preparation electrical requirements, cables and connectors
3. Market Survey of products (at least one from each module)
4. Identification of block and tracing the system. Assembly and Disassembly of system using Toolkit
5. Assembly and Disassembly of system and printer.

NOTE: one activity as directed in practical course is equivalent to 4 experiments

SEMESTER – VI

INTERNSHIP

Programme: B.Sc. Honours in Electronics (Minor)

w.e.f. AY 2023-24
COURSE STRUCTURE & ALLOCATION OF CREDITS

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	II	1	Fundamental of Electricity and Electronics	3	3
			Fundamental of Electricity and Electronics Practical Course	2	1
II	III	2	Semiconductor devices and Materials	3	3
			Semiconductor devices and Materials Practical Course	2	1
	IV	3	Electrical and electronics instrumentation	3	3
			Electrical and electronics instrumentation Practical Course	2	1
		4	Microprocessor system	3	3
			Microprocessor system Practical Course	2	1
III	V	5	Cellular Mobile Communication	3	3
			Cellular Mobile Communication Practical Course	2	1
		6	Computer Network	3	3
			Computer Network Practical Course	2	1

Departmental Activity Proposals
GOVERNMENT COLLEGE (A):: RAJAMAHENDRAVARAM
DEPARTMENT OF PHYSICS & ELECTRONICS
As Approved in the BOS meeting held on 30th AUGUST 2023 for 2023-2024

S.No	Name of the Activity	Tentative Dates
1	Guest Lectures	Last Week of December 2023
2	Field Trip	Third Week of January 2024
3	Guest Lectures	Last Week of January 2024
4	State level Seminar on Micro Electronics	First Week of February 2024
6	Open Day (All the labs are open for the City people to visit)	Third Week of February 2024
7	National Science Day Celebrations	28th February 2024
8	Guest Lectures	First Week of March 2024
9	Einstein's Birth Day Celebrations	14th March 2024

THE END