Placed at the meeting of
Academic Council
held on 15.11.2023

APPENDIX-AM

MADURAI KAMARAJ UNIVERSITY

(University with Potential for excellence)

B.SC.,PHYSICS(SEMESTER)

CHOICE BASED
CREDIT SYSTEM
REGULATIONS
AND SYLLABUS

(This will come in to effect from the academic year 2023 onwards)

1. INTRODUCTION OF THE PROGRAMME:

Physics is often considered to be the most fundamental science. It is the basis of all otherscience subjects. It explains natural phenomena in the Universe. A bachelor degree in Physics isa great foundation for career in government jobs, industries, educational institutions, labs etc.,Physics brings a broad perspective to any problem. This intensive thinking makes the Physicistdesirable in any field. That's why Physics graduates can expect career salaries similar to those ofcomputerscience andengineering major.

2. QUALIFICATION FOR ADMISSION:

Candidates should have passed the higher secondary Examination conducted by the board of Higher Secondary Examination, Government of Tamilnadu or any other examination acceptedbythesyndicateofMaduraiKamarajUniversityasequivalenttheretowithPHYSICSasoneofthesubjectsalongwithMATHEMATICSinHigherSecondaryEducation.

3. DURATION OF THE COURSE:

The students shall undergo the prescribed course of study for a period of three academicyears(sixsemesters).

4. MEDIUM OF INSTRUCTION: English/ Tamil

5. OBJECTIVE OF THE PROGRAMME:

The UG course in Physics helps the students to understand the world around us,the world inside us and the world beyond us. Physics encompasses the study of the universe from the smallest subatomic particles to the largest galaxies. Moreover it is the basisif many sciences like chemistry,oceanography,seismology and can be applied to a bachelor's degree in physics.

Physics challenges our imagination with concepts like relativity and string theory. It leadsto great discoveries like computers and lasers that lead to technologies which change our lives –from healing joint stocuring cancer and to develop sustainable energy solutions.

6. OUTCOME OF THE PROGRAMME:

The syllabus for B.Sc., Physics degree under semester system has been designed on the basis of Choice Based Credit System,(CBCS)which would focus on job oriented programme sand values added education. It will effect from June 2023 onwards. Duration of the course is threeyears. The students who are joining the B.Sc., (Physics) degree shall undergo a study period of three academic years-Sixsemesters.

7. OUTCOMEOFTHEPROGRAMME

The Syllabus for B.Sc., Physics degree under semester system has been designed on the basis of Choice Based Credit System, (CBCS) which would focus on job oriented programme sand values added education. It will effect from June 2023 onwards. Duration of the course is threeyears. The students who are joining the B.Sc., (Physics) degree shall undergo a study period of three academic years – Six Semesters.

While preparing the syllabus, care is taken to provide there quirements of students who optphysics, for developing their skill and competence in their career. Hence after completion of the course, the student will been riched with recent trendsin Physics and be motivated towards higher studies and research activities. During the preparation of the syllabus and curriculum, the UGC model curriculum and syllabi of world best universities were considered.

8. UNITIZATION:

The important concepts of each subject is uniformly distributed in five units and properly required hours to teach are allotted.

9. PATTERN OF SEMESTER EXAMINATION:

The semester examination comprises of two parts i) internal assessment and ii) External examination. The maximum marks for the internal and external examinations are 25 and 75 respectively.

10. THE SCHEME FOR INTERNAL ASSESSMENT:

The Pattern for internal valuation

- Two tests will be conducted (10mark each).The average of the two is taken–10marks
- 3rd test may be allowed for absentees of anyone of the two tests.
- Group Discussion / Seminar / Quiz–5marks.
- For Quiz, 2 Quiz should be conducted.
- 2 Assignments: 5 mark each; average 5 marks
- Peer team teaching and Peer group learning – 5marks

(Students should be grouped into 5 or 6 members.10% of each subject shall be taught through peer team teaching and learning method and appropriate hours should be allotted.

11. EXTERNAL EXAMINATION:

Student should appear for the external examination at the end of each semester. The University semester examinations will be conducted in the month of November and April for odd and even semesters respectively. He /she must satisfy the minimum attendance as prescribed by the University.

12. QUESTION PAPER PATTERN:

The pattern of Question paper will be as follows.

EXTERNAL

Time: 3 hours Max.Marks:75

SECTION A (10X1=10Marks)

Question No. 1to10 (MultipleChoices)

- Two questions from each unit
- Four choices in each question
- No‘ none of these‘choice.

SECTION B (5X7=35marks)

- Answer all questions choosing either (a) or(b)
- Answer not exceeding two pages.(One question from each unit)

Question No:11-15

11	(a)	or	11	(b)
12	(a)	or	11	(b)
13	(a)	or	11	(b)
14	(a)	or	11	(b)
15	(a)	or	11	(b)

SECTION C (3X10=30marks)

- Answer not exceeding four pages.
- Answer any three out of five (1 Question from each unit)

Questions16-20

Section	Types of questions	No.of questions	No.of questions to be answered	Marks for each question	Total Marks
A	Multiple Choice.Two questions from each unit	10	1	1	10
B	Not exceeding 2.Pages (either or type)-One from each unit*	5	5	7	35
C	Not exceeding 4 Pages (any three out offive-one from each unit	5	3	10	30

*There must be atleast one problem insection B

13. There will be Two Allied subjects to fulfill the course during three years.

Subject	**Maximum marks**	**Credit**	**Year ofstudy**
Mathematics	200	8	I

Chemistry	400	12	II

The syllabus for the ancillary subject scan be got from the Ancillary Department of Mathematics,Chemistry/ Applied electronics.

- Practical: Record NoteBook/ Internal 5+20 = 25
  Examination external = 75

  Total 100

14. SCHEMEOFEVALUATION:

For the University theory examination the question paper setter should submit the scheme of valuation along with the question paper for each subject.

15. PASSING MINIMUM:

i) A candidate will be eligible for the B.Sc., degree by completing three years(six semesters) and passing all the prescribed examinations.

ii) A candidate shall be declared as passed the course, if he/she scored a minimum of 35% marks in each paper of all the subjects. He/ She must score a minimum of 27 marks out of 75 in the external examination and a minimum of 40(internal+external)outof100.

Classification

Sl.No	Range of CGPA	Class
1	40 & above but below 50	III
2	50 & above but below 60	II
3	60 & Above	I

16. MODEL QUESTION PAPER

Model question paper for a few core subject and skilled based papers of Physics are given below.

(For those who joined in June 2023)

Time:Three hours Maximum:75 Marks

Analog Electronics

Section–A

Answer all the questions,choosing correct answer:-

(10X 1=10Marks)

1. When a pentavalentim purity is added to a pure semiconductor, it becomes_____
   a) An insulator b)an intrinsic semiconductor
   c) p-type semiconductor d) n-type semiconductor

2. An-type semiconductoris
   a) Positively charged b) negatively charged
   C) remains the same d) none of the above

3. Azener diodeis always_____connected
   a) reverse b) forward
   c) either reverse or forward d) none of the above

4. Transist or Biasingis generally provided by a _____
   a) biasing circuit b) bias battery c)diode d) none of the above

5. For proper operation of the transistor, its collector should have_____
   a) proper forward bias b) proper reverse bias
   c) very small size d) none of the above

6. AJFET has three terminals,namely
   a) cathode,anode,grid b)emitter,base, collector
   b) source,drain,gate d)positive,negative, earth

7. A MOSFET has_____terminals
   a) two b)three c)four d) four

8. The maximum efficiency of a class B push pul lamplifieris
   a)25% b)50% c)79% d)98%

9. Demodulation done in _____
   a) receiving an tenna b) transmitter c) radio receiver d) transmitting an tenna

10. In TV transmission picture signalis_____modulated

   a) frequency b)phase c) amplitude d) none of the RECTTIFICATION REPORTabove

Section–B

Answer all the questions,choosing either 'a' or 'b':-

(5X7=35Marks)

11. a) Write a note on working of a forward bias of a PN junction.

(OR)

b) Explain the phenomena of avalanche breakdown, zener breakdown and IV characteristics of zenerdiode.

12. a) Explain briefly about volt age divider bias.**(OR)**

b) Write down the relation between α, β and γ

13. a) Explain briefly about Operational Amplifier characteristics.

(OR)

b) Explain about the construction and working of operational amplifier as an integrator

14. a) Explain briefly about Barkhausen criteria in negative feedback

(OR)

b) An amplifier has a gain of 300. When negative feedback is applied, the gain isreducedto 240.Findthe feedbackratio.

15. a) Derive an expression for modulation index in terms of maximum and minimum amplitude of AM wave. **(OR)**

b) Explain the character is tics of a good receiver.

Section–C

Answer any three questions. (3X10=30Marks)

16. Explain the construction and working of a full wave Bridge rectifier with neat diagram.

17. Explain the mathematical explanation for alow pass filter.

18. Explain the construction and working of a Junction Field Effect Transistor.

19. Explain the construction and working of a push pull amplifier.

20. Explain about the working of Hartley oscillator, and derive the frequency of oscillator with mathematical derivation.

17. TEACHING METHODOLOGY:

Usual chalk and talk method may be followed. A part from this seminar, Group Discussion, Peer Team Teaching and Peer Group Learning are practiced in the class room.Teaching aids like Charts are also used in the classroom,Now a days Computer Aided Technology, E-learning, Smart Class Room Practices with Power Point Presentations are also followed.

18. TEXTBOOKS

The list of text books prescribed for each subject is given under the syllabus of concerned subject.

19. REFERENCEBOOKS

The list of text books prescribed for each subject is given under the syllabus of concerned subject.

20. RE-TOTALINGANDREVALUATIONPROVISION

Students may apply for re-totaling and revaluation after declaration of result with in 7 days

B.Sc., PHYSICS SYLLABUS

Preamble

Physics is one of the basic and fundamental sciences.The curriculum for the undergraduate programme in Physics is revised as per the UGC guide line son Learning Out come based Course Framework. The learner-centric courses let the student progressively develop a deeper understanding of various aspects of physics.

The new curriculum offer courses in the core areas of mechanics, acoustics, optics and spectroscopy, electricity and magnetism, atomic and nuclear physics, solidstate, electronics and other fields.The courses will train students with sound the oretical and experimental knowledge that suits the need of academics and industry. In addition to the theoretical course work, the students also learn physics laboratory methods for different branches of physics, specialized measurement techniques, analysis of observational data,including error estimation and etc. The students will have deeper understanding of laws of nature through the subjects like classical mechanics, quantum mechanics, statistical physics etc. The problem solving ability of students will been hanced. The student scan apply principles in physics to real life problems. The courses like integrated electronics and micro processors will enhance the logical skills as well as employability skills. The numerical methods and mathematical physics provide analytical thinking and provides a better platform for higher level physics for research.

There structured courses with well-defined objectives and learning outcomes,provide guidance to prospective students in choosing the elective courses to broaden their skills notonly in the field of physics but also in inter disciplinary areas. The elective modules of the framework offer students choice to gain knowledge and expertise in specialized domains of physics like astro physics,medical physics,etc.

TANSCHE REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAME WORK FOR UNDERGRADUATE EDUCATION	
Programme	**B.Sc.,Physics**
Programme Code	
Duration	**3 years[UG]**
Programme Outcomes: (Theseare mereguidelines.Facultycan createPOs basedon their curriculumor adoptfrom UGCorthe Universityfor their Programme)	**PO1:Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding Of one or more disciplines that form a part of an undergraduate Programme of study **PO2:Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally Communicate with others using appropriate media confidently share one's views and express her self / him self; demonstrate the ability to listen Carefully read and write analytically and present complex information in a Clear and concise manner to different groups. **PO3:Critical thinking:** Capability to apply the analytic thought to a body of knowledge;analyse And evaluate the proofs,arguments,claims,beliefs on the basis of Empirical evidences identify relevant as sumptions or implications; Formula tecoherent arguments;critically evaluate practices, policies and The ories by following scientific approach. **PO4:Problem solving:**

	Capacity to extra polate from what one has learned and apply their Competencies to solve different kinds of non-familiar problems,rather than Replicate curriculum content knowledge and apply one's learning to real Life situations. **PO5:Analyticalreasoning**: Ability to evaluate there liability and relevance of evidence identify logical Flaws and holes in the arguments of others analyze and syn the size data From a variety of sources draw valid conclusions and support them with Evidence and examples and addressing opposing view points.

	PO6:Research-related skills: A sense of inquiry and capability for asking relevant / appropriate questions,problem arising, synthesizing and articulating;Ability to recognize cause – and –effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan,execute and report the result so fan experiment or investigation **PO7:Cooperation / Teamwork:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team. **PO8:Scientific reasoning**: Ability to analyse, interpret and draw conclusions from quantitative / qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective. **PO9:Reflective thinking**: Critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society. **PO10: Information / digital literacy:** Capability to use ICT in avariety of learning situations,demonstrate ability to access, evaluate, and use a variety of relevant information sources and use appropriate software for analysis of data. **PO11: Self-directed learning**: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion. **PO12 Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and aglobal perspective; and capability to effectively engage in a multicultural society and inter act respect fully with diverse groups. **PO13:Moralandethical awareness / reasoning**: Ability to embrace moral/ethical values in conducting one's life, formulate a position / argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behavior such as fabrication, falsification or misre presentation of data or committing plagiarism, notadhering to intellectual property rights appreciating environmental and sustainability issues;and adopting objective,unbiased and truthful actions in all aspects of work. **PO14:Leadership readiness / qualities:** Capability for mapping out the tasks of a team or an organization, andsetting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination,in a smooth and efficient way. **PO15:Life long learning:** Ability to acquire knowledge and skills, including „learning how to learn‟,that are necessary for participating in learning activities through out life,through self – paced and self-directed learning aimed at personal development, meeting economic,social and cultural objectives, and adapting to changing trades and demands of work place through knowledge / skill development / reskilling.

Programme SpecificOutcomes: **(These aremereguidelines.Faculty cancreate POsbased on theircurriculum oradopt fromUGC orUniversity fortheirProgramme)**	**PSO1:Placement:** To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, and beliefs and apply diverse frames of reference to decisions and actions. **PSO2**: **Entrepreneur:** To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate start-ups and high potential organizations **PSO3**:**Research and Development:** Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development. **PSO4**:**ContributiontoBusinessWorld:** To produce employable, ethical and innovative professionals to sustain in the dynamic business world. **PSO5**:**Contribution to the Society:** To contribute to the development of the society by collaborating withs take holders for mutual benefit

3–Year UG Programme B.Sc.,Physics Credit Distribution				
Part	**Details**	**No. of Papers**	**Total Credits**	**Total Hours**
Part-I	Language (3 Credits)	4	12	24
Part-II	English (3 Credits)	4	12	24
Part-III	Core Theory(5Credits)	8	40	40
	Core Theory(4Credits)	2	8	10
	Allied Theory(5 Credits)	2	10	12
	Allied Theory(4 Credits)	2	8	8
	Core Practical (3 Credits)	5	15	26
	Allied Practical(2Credits)	1	2	4
Part-IV	Foundation Course (2 Credits)	1	2	2
	Ability Enhancement Compulsory Course(AECC)(2credits)	1	2	2
	Skills Enhancement Course(SEC)(2Credits)	8	16	16
	Elective Core(2Credits)	2	7	8
	Summer Internship (1Credits)	1	1	-
	EVS(2Credit)	1	2	2
	Value Education(2 Credits)	1	2	2
Part-V	Extension Activity (NSS/NCC/YRC/RRC/ Physical Education) (1Credit)	1	1	-
		47	**140**	**180**

Semester	Details	Credit	No.of Hours
I	Part-I-Tamil-1	3	6
II	Part-I-Tamil-2	3	6
III	Part-I-Tamil-3	3	6
IV	Part-I-Tamil-4	3	6
I	Part-II-English-1	3	6
II	Part-II-English-1	3	6
III	Part-II-English-1	3	6
IV	Part-II-English-1	3	6
TOTAL		**24**	**48**
	CoreTheory		
I	Properties of Matter and Acoustics	5	5
II	Heat,Thermodynamics and Statistical Physics	5	5
III	Mechanics	5	5
IV	Optics and Laser Physics	5	5
V	Electricity,Magnetism and Electro magnetism	5	5
V	Atomic and Nuclear Physics	5	5
V	Analog and Communication Electronics	5	5
VI	Quantum Mechanics and Relativity	5	5
VI	Solid State Physics	4	5
VI	Digital Electronics and Microprocessor 8085	4	5
I	Core Practical-1	-	3
II	Core Practical-1	3	3
III	Core Practical-2	-	3
IV	Core Practical-2	3	3
V	Core General Practical-3	-	3
V	Core Analog Electronics Practical-4	-	2
V	Core Digital Electronics Practical-5	-	2
VI	Core General Practical-3	3	3
VI	Core Analog Electronics Practical-4	3	2
VI	Core Digital Electronics Practical-5	3	2
	Total	**59**	**76**
	Allied Papers		
I	Allied Mathematics-Theory-I	5	6
II	Allied Mathematics-Theory-II	5	6
III	Allied Chemistry / Applied Electronics-I-Theory-I	4	4
III	Allied Chemistry / Applied Electronics-I-Practical-I	-	2
IV	Allied Chemistry/ Applied Electronics-II-Theory-II	4	4
IV	AlliedChemistry / Applied Electronics-II-Practical -II	2	2
	Total	**20**	**24**
I	**Foundation Course**	**2**	**2**

Semester	Details	Credit	No.of Hours
Ability Enhancement Compulsory Course			
V	Ability Enhancement Compulsory Course (AECC) -3 Employability Skills / Naan Mudhalvan Course	2	2
TOTAL		**2**	**2**
	Skill Enhancement Course-8		
I	Skill Enhancement Course SEC-I Physics for Everyday Life(NME)	2	2
II	Skill Enhancement Course SEC-II Space Physics (NME)	2	2
II	Skill Enhancement Course SEC-III D/SSC-Programming	2	2
III	Skill Enhancement Course SEC-IV EB Bio medical Instrumentation	2	2
III	Skill Enhancement Course SEC-V D/SS Electrical Wiring/Naan Mudhalvan Course	2	2
IV	Skill Enhancement Course SEC-VI D/SS Energy Physics	2	2
IV	Skill Enhancement Course SEC-VII D/SS Material Science / Naan Mudhalvan Course	2	2
VI	Skill Enhancement Course SEC – VIII D/SS Communication Physics / Naan Mudhalvan Course	2	2
	Total	**16**	**16**
	Elective Course		
V	Elective Course-1Mathematical Physics	4	4
VI	Elective Course-2 Nano Science/Project	3	4
	Total	**7**	**8**
V	EVS	2	2
VI	Value Education	2	2
	Total	**4**	**4**
V	Internship / Industrial Training(Carried out in II Year Summer Vacation) (30Hours)	1	-
VI	Extension Activity, NSS/NCC/YRC/RRC/Physical Education (Outside College Hours)	1	-
Total		**140**	**180**

Credit Distribution for B.Sc.,Physics Programme, Courses with Laboratory Hours

FIRSTYEAR SEMESTERI

Part	List of courses	Credit	No. of Hours
Part-I	Language	3	6
Part–II	English	3	6
Part-III	Core Theory-1.Properties of Matter and Acoustics	5	5
	Core Practical-1	-	3
	Allied Mathematics Theory-I	5	6
Part–IV	Skill Enhancement Course SEC-I / (NME) Physics for Everyday Life	2	2
	Foundation Course	2	2
Total		**20**	**30**

FIRST YEAR SEMESTER II

Part	Listofcourses	Credit	No.of Hours
Part-I	Language	3	6
Part–II	English	3	6
Part-III	Core Theory-2. Heat,Thermo dynamics and Statistical Physics	5	5
	Core Practical-1	3	3
	Allied Mathematics Theory-II	5	6
Part–IV	Skill Enhancement Course SEC-II (NME) Space Physics	2	2
	Skill Enhancement Course SEC-III (Discipline / Subject Specific) C-Programming	2	2
Total		**23**	**30**

SECOND YEAR SEMESTER III

Part	List of courses	Credit	No.of Hours
Part-I	Language	3	6
Part–II	English	3	6
Part-III	Core Theory – 3.Mechanics	5	5
	Core Practical -2	-	3
	Allied Chemistry–1 / Applied Electronics–I –Theory-I	4	4
	Allied Chemistry-I / Applied Electronics–I Practical-1	-	2
Part-IV	Skill Enhancement Course SEC – IV (Entrepreneurial Based) Biomedical Instrumentation	2	2
	Skill Enhancement Course SEC-V (Discipline / Subject Specific)Electrical Wiring / Naan Mudhalvan Course	2	2
Total		**19**	**30**

SECOND YEAR SEMESTER IV

Part	List of courses	Credit	No. of Hours
Part-I	Language	3	6
Part–II	English	3	6
Part-III	Core Theory – 4.Optics and Laser Physics	5	5
	Core Practical-2	3	3
	Allied Chemistry-I 1/ Applied Electronics–II–Theory-II	4	4
	Allied Chemistry-II / Applied Electronics–II Practical–II	2	2
Part-IV	Skill Enhancement Course SEC- VI(Discipline / Subject Specific) Energy Physics	2	2
	Skill Enhancement Course SEC-VII (Discipline / Subject Specific) Material Science / NaanMudhalvan Course	2	2
Total		**24**	**30**

THIRD YEAR SEMESTER V

Part	Listofcourses	Credit	No.of Hours
Part-III	Core Theory- 5. Electricity, Magnetism and Electro magnetism	5	5
	Core Theory-6.Atomic and Nuclear Physics	5	5
	Core Theory-7.Analog and Communication Electronics	5	5
	Core Practical-3.General Practical.	-	3
	Core Practical-4.Analog Electronics Practical.	-	2
	Core Practical-5.Digital Electronics Practical.	-	2
	Elective Course-1.Mathematical Physics	4	4
Part-IV	Internship / Industrial Training (Carried out in II year Summer Vacation)(30 Hours)	1	-
	EVS	2	2
	Ability Enhancement Compulsory Course(AECC)-3 / Employability Skills / NaanMudhalvan Course	2	2
Total		24	30

THIRDYEAR SEMESTERVI

Part	Listofcourses	Credit	No.of Hours
Part-III	Core Theory – 8.Quantum Mechanics and Relativity	5	5
	Core Theory – 9.Solid State Physics	4	5
	Core Theory-10. Digital Electronics and Microprocessor 8085	4	5
	Core Practical-3.General Practical.	3	3
	Core Practical-4.Analog Electronics Practical.	3	2
	Core Practical-5.Digital Electronics Practical.	3	2
	Elective Course-2.Nano Science and NanoTechnology /Project	3	4
Part-IV	Skill Enhancement Course SEC-VIII (Discipline / Subject Specific) Communication Physics / NaanMudhalvan Course	2	2
	Value Education	2	2
Part-V	Extension Activity, NSS/NCC/YRC/ RRC/ Physical Education (Outside College Hours)	1	-
Total		30	30

Semesters	Credit	No.of Hours
Semester-I	20	30
Semester- II	23	30
Semester-III	19	30
Semester-IV	24	30
Semester-V	24	30
Semester-VI	30	30
Total	140	180

Consolidated Semester wise and Component wise Credit Distribution

Parts	Sem-I	Sem-II	Sem-III	Sem-IV	Sem-V	Sem-VI	Total Credits
Part-I	3	3	3	3	-	-	12
Part-II	3	3	3	3	-	-	12
Part-III	10	13	9	12	19	25	88
Part-IV	4	4	4	6	5	4	27
Part-V	-	-	-	-	-	1	1
Total	**20**	**23**	**19**	**24**	**24**	**30**	**140**

COURSE	**FIRST SEMESTER– FOUNDATION COURSE**
COURSE TITLE	**INTRODUCTORY PHYSICS**
CREDITS	2
COURSE OBJECTIVES	To help students get an overview of Physics before learning their core courses.To serve as a bridge between the school curriculum and the degree programme.
UNITS	**COURSE DETAILS**
UNIT-I	vectors, scalars –examples for scalars and vectors from physical quantities – addition, subtraction of vectors – resolution and result ant of vectors – units and dimensions – standard physics constants
UNIT-II	Different types of forces-gravitational, electrostatic, magnetic, Electro magnetic, nuclear –mechanical forces like centripetal, centrifugal,friction,tension, cohesive,adhesiveforces
UNIT-III	different forms of energy – conservation laws of momentum, energy – types of collisions-angular moment um-alternate energy sources – real life examples
UNIT-IV	types of motion- linear, projectile, circular, angular, simple harmonic motions-satellite motion – banking of a curved roads-stream line and turbulent motions-wave motion-comparison of light and sound waves – free, forced, damped oscillations
UNIT-V	Surface tension – shape of liquid drop – angle of contact – viscosity-lubricants-capillary flow- diffusion-real life examples-properties and types of materials in daily use- conductors, insulators-thermal and electric
UNIT-VI	**PROFESSIONAL COMPONENTS:** expert lectures – seminars– webinars – industry inputs – social accountability – patriotism
TEXTBOOKS	1. D.S. Mathur, 2010, Elements of Properties of Matter,S.Chandand Co 2. BrijLal and N. Subrahmanyam, 2003, Properties of Matter,S.ChandandCo.
REFERENCEBOOKS	1.H.R. Gulati, 1977, Fundamental of General Properties of Matter,Fifth edition, S.Chandand Co.
WEBRESOURCES	1. http:// hyperphysics.phy-astr.gsu.edu/hbase/permot2.htmlhttps://science.nasa.gov/ems/ 2. https://eesc.columbia.edu/courses/ees/climate/lectures/radiation_hays/

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

COURSE OUTCOMES:
At the end of the course, the student will be able to:

COURSE OUTCOMES	**CO1**	Apply concept of vectors to under stand concepts of Physics and solve problems
	CO2	Appreciate different forces present in Nature while learning about phenomenarelated to these different forces.
	CO3	Quantify energy in different process and relate momentum,velocity and energy
	CO4	Differentiate differentty pesofmotions they would encounter in various courses and understand their basis
	CO5	Relate various properties of matter with their behavior and connect them with different physical parameters involved.

MAPPING WITH PROGRAM OUTCOMES:

Map course outcomes **(CO)** for each course with program outcomes **(PO)**in the 3-point scale of STRONG(**3**),MED IUM(**2**)and LOW(**1**).

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

COURSE	**FIRST SEMESTER–CORE THEORY1**
COURSE TITLE	**PROPERTIES OF MATTER AND ACOUSTICS**
CREDITS	**5**
COURSEOBJECTIVES	Study of the properties of matter leads to information which is of practical value to both the physicist and the engineers. It gives us information about the internal forces which act between the constituent part soft he substance. Students who under go this course are successfully bound to get a better in sight and understanding of the subject.
UNITS	**COURSE DETAILS**
UNIT-I	**ELASTICITY:**Hooke's law-stress-strain diagram-elastic constants -Poisson'sratio-relation between elastic constants and Poisson'sratio-work done in stretching and twisting a wire - twisting couple on a cylinder - rigidity modulus by statictorsion-torsionalpendulum (with and without masses)

UNIT-II	**BENDING OF BEAMS:**cantilever–expression for Bending moment – expression for depression at the loaded end of the cantilever–oscillations of a cantilever – expression for time period – experiment to find Young's moduluss by Koenig's method–uniform bending–expression for elevation–experiment to determine Young's modulus Using microscope
UNIT-III	**FLUIDDYNAMICS:** *Surface tension*: definition – molecular forces–excess pressure over curved surface–application to spherical and cylindrical drop sand bubbles – determination of surface tension by Jaegar's method–variation of surface tension with temperature *Viscosity*: definition – stream line and turbulent flow–rate of flow of Liquid in a capillary tube – Poiseuille's formula – corrections–terminal velocity and Stoke's formula – variation of viscosity with temperature
UNIT-IV	**WAVES AND OSCILLATIONS:** Simple Harmonic Motion (SHM) – differential equation of SHM – graphical representation of SHM – composition of two SHM in a straight line and at right angles – Lissajous's figures- free, damped, forced vibrations –resonance and Sharpness of resonance. Laws of transverse vibration instrings – sonometer–determination of AC frequency using sonometer–determination off requency using Melde's string apparatus
UNIT-V	**ACOUSTICS OF BUILDINGS ANDULTRASONICS:** Intensity of sound–decibel–loudness of sound–reverberation–Sabine's reverberation formula – acoustic intensity – factors affecting the a coustics of buildings. *Ultra sonic waves*: production of ultra sonic waves–Piezo electric crystal method –magnetostriction effect – application of ultra sonic waves
UNIT-VI	**PROFESSIONAL COMPONENTS:**expert lectures – seminars – webinars–industry inputs – social accountability– patriotism
TEXTBOOKS	1. D.S.Mathur, 2010, Elements of Properties of Matter,S.ChandandCo. 2. BrijLal and N. Subrahmanyam, 2003, Properties of Matter,S.ChandandCo 3. D.R.Khanna and R.S.Bedi, 1969, Textbook of Sound,AtmaRamandsons 4. BrijLal and N.Subrahmanyam, 1995, A Text Book of Sound,Secondrevised edition,VikasPublishingHouse. 5. R.Murugesan,2012,PropertiesofMatter,S.ChandandCo.
REFERENCE BOOKS	1. C.J. Smith, 1960, General Properties of Matter, Orient LongmanPublishers 2. H.R. Gulati, 1977, Fundamental of General Properties of Matter,Fifthedition,R.ChandandCo. 3. A.P French, 1973, Vibration and Waves, MIT IntroductoryPhysics,Arnold-HeinmannIndia.
WEB RESOURCES	1. https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work 2. http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html 3. https://www.youtube.com/watch?v=gT8Nth9NWPM 4. https://www.youtube.com/watch?v=m4u-SuaSu1sandt=3s 5. https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work 6. https://learningtechnologyofficial.com/category/fluid-mechanics-

	lab/ 7. http://www.sound-physics.com/ 8. http://nptel.ac.in/courses/112104026/

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	75	100

COURSE OUTCOMES:

At the end of the course,the student will be able to:

COURSE OUTCOMES	**CO1**	Relate elastic behavior intermsof three modulii of elasticity and Working of torsion pendulum.
	CO2	Able to appreciate concept of bending of beams and analyze the expression,quantify and understand nature of materials.
	CO3	Explain the surface tension and viscosity of fluid and support the interesting phenomena associated with liquid surface,soap films provide an analogue solution to many engineering problems.
	CO4	Analyze simple harmonic motions mathematically and apply them.Under stand the concept of resonance and use it to evaluate the frequency of vibration. Set up experiment to Evaluate frequency of ac mains
	CO5	Understand the concept of a coustics,importance of constructing buildings with good a coustics. able to apply their knowledge of ultra sonics in real life,especially in medical field and assimilate different methods of production of ultra sonic waves

MAPPING WITH PROGRAM OUTCOMES:

Map course outcomes**(CO)**for each course with program outcomes**(PO)**in the 3-point scale of STRONG (**S**),MEDIUM(**M**)and LOW(**L**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	M	M	S	M	M	S	M	S
CO2	M	S	S	S	M	M	S	M	S	S
CO3	S	M	S	M	S	S	M	S	S	S
CO4	S	S	S	S	S	M	S	M	M	M
CO5	M	M	S	S	M	S	S	S	S	M

SKILL ENHANCEMENT COURSES (SEC)

SEC–1/ NME

PHYSICS FOR EVERYDAY LIFE	
Learning Objective: To know where all physics principles have been put to use in daily Life and appreciate the concepts with a better under standing also to know about Indian scientists who have made significant contributions to Physics.	
UNITS	**COURSE DETAILS**
UNIT-I	**MECHANICAL OBJECTS:** Spring scales- bouncing balls-roller coasters – bicycles – rockets and space travel.
UNIT-II	**OPTICAL INSTRUMENTS AND LASER:** Vision corrective lenses – polaroid glasses – UV protective glass – polaroid camera – colour photography– holography and laser.
UNIT-III	**PHYSICS OF HOME APPLIANCES:** Bulb-fan-hair drier-television -air conditioners – microwaveovens-vacuum cleaners
UNIT-IV	**SOLAR ENERGY:** Solar constant – General applications of solar energy-Solar water heaters-SolarPhoto-voltaiccells-General applications of solar cells.
UNIT-V	**INDIAN PHYSICIST AND THEIR CONTRIBUTIONS:**C.V.Raman, Homi Jehangir Bhabha, Vikram Sarabhai, Subrahmanyan Chandrasekhar, Venkatraman Ramakrishnan, Dr.APJ Abdul Kalamand their contribution to science and technology.
TEXTBOOKS	1. The Physics in our Daily Lives, Umme Ammara, Gugucool Publishing, Hyderabad, 2019. 2. For the love of physics,Walter Lawin, Free Press,NewYork,2011.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

COURSE	**SECOND SEMESTER–CORE THEORY 2**
COURSE TITLE	**HEAT, THERMO DYNAMICS and STATISTICAL PHYSICS**
CREDITS	**5**
COURSE OBJECTIVES	The course focuses to understand a basic in conversion of temperature in Celsius, Kelvin and Fahrenheit scales. Practical exhibition and explanation of transmission of heat in good and bad conductor. Relate the laws of thermo dynamics, entropy in everyday life and explore the knowledge of statistical mechanics and its relation
UNITS	**COURSE DETAILS**
UNIT-I	**CALORIMETRY:** specific heat capacity-specific heat capacity of gases C_P and C_V- Meyer's relation –Joly's method for determination of C_V-Regnault's method for determination of C_P **LOW TEMPERATURE PHYSICS:** Joule-Kelvin effect-porous plug experiment – Joule-Thomson effect -Boyle temperature – temperature of inversion – liquefaction of gas by Linde's Process- a diabatic demagnetisation.

UNIT-II	**THERMODYNAMICS-I:** zeroth law and first law of thermo dynamics – P-V diagram – heat engine –efficiency of heat engine – Carnot'sengine, construction, working and efficiency of petrol engine and diesel engines–comparison of engines.
UNIT-III	**THERMODYNAMICS-II:** second law of thermo dynamics –entropy of an ideal gas – entropy change in reversible and irreversible processes – T-S diagram –thermo dynamic cal scale of temperature –Max well's thermo dynamical relations–Clasius-Clapeyron's equation (first latent heat equation) – third law of thermodynamics –un attainability of absolute zero–heat death.
UNIT-IV	**HEATTRANSFER:** modes of heat transfer: conduction, convection and radiation. *Conduction*: thermal conductivity– determination of thermal conductivity of a good conductor by Forbe's method-determination of thermal conductivity of a bad conductor by Lee's disc method. *Radiation*: black body radiation (Ferry's method) – distribution of energy in black body radiation – Wien's law and Rayleigh Jean'slaw–Planck's law of radiation–Stefan's law–deduction of Newton's law of cooling from Stefan's law.
UNIT-V	**STATISTICALMECHANICS:** definition of phase-space – micro and macro states – ensembles –different types of ensembles – classical and quantum Statistics – Maxwell-Boltzmann statistics – expression for distribution function – Bose – Einstein statistics–expression for distribution function–Fermi-Diracstatistics–expression for distribution function – comparison of three statistics.
UNIT-VI	**PROFESSIONALCOMPONENTS:**expert lectures – seminars– webinars–industry inputs – social accountability– patriotism
TEXTBOOKS	1. Brijlal and N.Subramaniam, 2000, Heat and Thermodynamics, S.ChandandCo. 2. Narayanamoorthy and Krishna Rao, 1969, Heat, Triveni Publishers,Chennai. 3. V.R.Khanna and R.S.Bedi,19981st Edition,Text book of Sound , Kedharnaath Publish and Co, Meerut 4. Brijlal and N.Subramanyam, 2001,Waves and Oscillations, Vikas Publishing House, NewDelhi. 5. Ghosh, 1996, Text Book of Sound, S.Chandand Co. 6. R.Murugeshan and Kiruthiga Sivaprasath, Thermal Physics, S.Chand and Co.
REFERENCE BOOKS	1. J.B.Rajam1976, Heat and Thermo dynamics, 8th edition,S.Chand and Co. L and C.L.Arora,td. 2. D.S.Mathur, Heat and Thermo dynamics, Sultan Chand and Sons. 3. Gupta,Kumar,Sharma,2013, Statistical Mechanics, 26th Edition, S.ChandandCo. 4. Resnick, Halliday and Walker, 2010, Fundamentals of Physics, 6th Edition. 5. Sears, Zemansky,HughD.Young,RogerA.Freedman,2021 University Physics with Modern Physics15th Edition,Pearson.
WEBRESOURCES	1. https://youtu.be/M_5KYncYNyc 2. https://www.youtube.com/watch?v=4M72kQulGKkandvl=en 3. Lecture 1: Thermodynamics Part 1 | Video Lectures | Statistical Mechanics I: Statistical Mechanics of Particles | Physics | MIT Open Course Ware

	4.http://www.free book centre.net/Physics/Physics-Books-Online.html

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUTCOMES:
At the end of the course, the student will be able to:

COURSEOUTCOMES	**CO1**	Acquires knowledge on how to distinguish between temperature and heat.Introduce him / her to the field of thermometry and explain practical measurements of high temperature as well as low temperature physics.Student identifies the relationship between heat capacity, specific heat capacity. The study of Low temperature Physics sets the basis for the students to understand cryogenics, super conductivity, Super fluidity and Condensed Matter Physics
	CO2	Derive the efficiency of Carnot's engine. Discuss the implication soft he law sof Thermodynamics in diesel and petrol engines
	CO3	Able to analyze performance of thermodynamic systems viz Efficiency by problems.Gets an insightin to thermodynamic properties like enthalpy, entropy
	CO4	Study the process of thermal conductivity and apply it to good and bad conductors.Quantify different parameters related to heat,relate them with various physical parameters and analyse them
	CO5	Interpret classical statistics concepts such as phase space,ensemble, Max well-Boltzmann distribution law. Develop the statistical interpretation of Bose-Einstein and Fermi-Dirac. Apply to quantum particles such as photonand electron

MAPPING WITH PROGRAM OUTCOMES:

Map course outcomes**(CO)**for each course with program outcomes**(PO)**in the3-point scale of STRONG (**S**),MEDIUM(**M**)and LOW(**L**).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	S	M	S	S	S	M	M	S	M

CORE PRACTIAL – 1

COURSE	**EVEN SEMESTER- CORE**
COURSETITLE	**CORE PRACTICAL–I**
CREDITS	**3**
COURSEOBJECTIVES	Apply various Physics concepts to understand concepts of Properties of matter,Mechanics,surface tension,sound and viscosity setup Experimentation to verify the ories, quantify and analyse, able to doer or analysis and correlate results.

Minimum of Fourteen Experiments from the list:

1. Young's Modulus – Uniform bending- Pin & Microscope
2. Young's Modulus – Non-Uniform bending- ScaleandTelescope
3. Young's Modulus – Cantilever- Pin&Microscope
4. Young's Modulus – Cantilever- Dynamicmethod
5. Rigidity Modulus – StaticTorsion-Searle'smethod
6. Rigidity Modulus – Torsion Pendulum(without weight)
7. Rigidity Modulus – Torsion Pendulum(withweight)
8. Moment of Inertia – Torsion Pendulum
9. A.C.Frequency – Sonometer
10. Verification of laws -Sonometer
11. Frequency of tuning fork -Sonometer
12. Frequency of vibrator -Melde'sApparatus
13. Velocity of sound -Kundt'stube
14. Compound Pendulum –"g"
15. Thermal conductivity of bad conductor - Lee'sDisc
16. Viscosity of liquid -Stoke's method
17. Viscosity of liquid -Burette method
18. SurfaceTension -Capillary Rise
19. SurfaceTension -Drop weight method

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

SEC–2/ NME

SPACE PHYSICS	
Learning Objective: This course intends to introduce principles of astrophysics describing the science of formation an devolution of stars and interpretation of various heavenly phenomena and provide an understanding of the physical nature of celestial bodies along with the instrumentation and techniques used in astronomical research.	
UNITS	**COURSEDETAILS**
UNIT-I	**TELESCOPES:** Optical telescopes – magnifying power, brightness, resolving power and f/a ratio – types of reflecting and refracting telescopes- detectors and image processing-radio telescopes- Hubble space telescope.

UNIT-II	**SOLAR SYSTEM:** Bode's law of planetary distances – meteors, meteorites, comets, asteroids- Kuiperbelt- Oortcloud-detection of gravitational waves- recent advances in astrophysics.
UNIT-III	**ECLIPSES:** Types of eclipses-solareclipse-total and partialsolareclipse-lunareclipse-total and partiallunareclipse-transits. **THE SUN:**physical and orbital data-solaratmosphere-photosphere –chromosphere–solarcorona–prominences–sunspots–11years olar cycle–solarflares.
UNIT-IV	**STELLARE VOLUTION:**H-Rdiagram-birth and death of low mass,intermediate mass and massive stars- Chandrasekar limit-white dwarfs-neutron stars-pulsars-black holes-supernovae.
UNIT-V	**GALAXIES:**Classification of galaxies-galaxyclusters-interaction sofgalaxies,dark matter and superclusters-evolvinguniverse.
TEXTBOOKS	1. BaidyanathBasu, (2001). An introduction to Astrophysics, Second printing, Prentice–Hall of India(P)Ltd,NewDelhi. 2. K.S.Krishnaswamy,(2002),Astrophysics-a modern perspective,NewAgeInternational(P)Ltd,NewDelhi. 3. Shylaja, B.S. and Madhusudan, H.R.,(1999), Eclipse: A CelestialShadowPlay,Orient BlackSwan,

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

SEC-3

PROGRAMMING IN–C	
Learning Objective: The purpose of this course is to introduce students about the key Features and implementation of C, which is a power ful general purpose programming language available in all platforms and provide an in depth knowledge and skill in it.	
UNITS	**COURSE DETAILS**
UNIT-I	**IntroductiontoC:-**Basic structure of C programs – Characterset-C tokens- keyword and identifiers- Constants-Variables-Data types - Declaring variables-Initializing variables – type conversions.
UNIT-II	**Operators, Expressions & I/O functions:-** Types of operators – Arithmetic operators - Relational, logical, and assignment operators - Increment and decrement operators – Conditional operators – Bit wiseand special operators – arithmetic expressions – Mathematical functions- priority of operators-Data input and output-getchar(), putchar(),gets(), puts()-scanf(),printf()-escape sequence.
UNIT-III	**ControlStatements:-**Simple IF statement- Simple IF-ELSE statement- Block IF Statement – Block IF – ELSE statement-looping operation using while statement – for statement – Break statement – continue statement - Switch statement – Goto statement – Simple programs.(To find the solution of quadratic equation-Fibonacciseries -To find the biggest of three nos,factorial of ano,oddoreven.)

UNIT-IV	**Functions:-**Defining a function – Accessing a function–Category of function – Passing arguments to function –Recursion- Library function. Programs using functions– Binomialcoefficient,Sinseries,summing The numbers1 to nusing recursion.
UNIT-V	**Arrays:-** Defining an Array – Processing an array – one, two dimensional arrays–Simple programs using arrays:-(addition of two matrices-subtraction of two matrices-Multiplication of two matrices-Ascending and descending order.)
TEXTBOOKS	1. Theory and problems of programming with C–By ByronGottfried Second edition–TataMegrawHill,2004. 2. Programming in C–PradipDeyandManasGhosh,Oxford University Press,Second Edition.
REFERENCE BOOKS	1. Programming in C –ByE.Balagurusamy–ThirdEdition–TataMegrawHill,2004. 2. Programming in C by S. Ramasamy and P.Radhaganesan, Sci tech Publications (India) Private Limited, Chennai and Hyderabad,2006.

METHODOFEVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

COURSE	**THIRD SEMESTER-CORE**
COURSETITLE	**MECHANICS**
CREDITS	**5**
COURSE OBJECTIVES	This course allows the students: To have a basic understanding of the laws and principles of mechanics; To apply the concepts of forces existing in the system; to understand the forces of physics in every day life;To visualize conservation laws;To apply Lagrangian Equation to solve complex problems.

UNITS	COURSE DETAILS
UNIT-I	**LAWS OF MOTION:** Newton's Laws – forces – equations of motion – Frictional force –motion of a particle in a uniform gravitation alfield – types of everyday forces in Physics. *Gravitation*: Classical theory of gravitation–Kepler's laws, Newton'slaw of gravitation – Determination of G by Boy's method – Earth-moon system – weightlessness – earth satellites – parking orbit –earth density – mass of the Sun – gravitational potential – velocity of escape – satellite potential and kinetic energy –Einstein's theory of gravitation – introduction –principle of equivalence – experimental test sof general theory of relativity-gravitation alred shift–bending of light–perihelion of mercury.

UNIT-II	**CONSERVATION LAWS OF LINEAR AND ANGULAR MOMENTUM: c**onservation of linear and angular momentum – Internal forces and momentum conservation – center of mass – examples–general elastic collision of particles of different masses –system with variable mass–examples–conservation of angularmomentum–torque due to internal forces–torque due to gravity–angularmomentum about center of mass–protonscattering by heavy nucleus.
UNIT-III	**CONSERVATION LAWS OF ENERGY:** Introduction – significance of conservation laws – law of conservation of energy concepts of work–power–energy–conservative forces–potential energy and conservation of energy in gravitational and electric field – examples –non- conservative forces – general law of conservation of energy.
UNIT-IV	**RIGID BODY DYNAMICS: t**ranslational and rotational motion – angular momentum – moment of inertia – general theorems of moment of inertia – examples – rotation about fixed axis – kinetic energy of rotation–examples–body rolling a long a plane surface – body rolling down an inclined plane – gyroscopic precision – gyrostatic applications.
UNIT-V	**LAGRANGIAN MECHANICS:** generalized coordinates–degreesof freedom–constraints-principle of virtua l work and D'Alembert's Principle – Lagrange's equation from D' Alembert's principle – application–simple pendulum–At wood's machine.
UNIT-VI	**PROFESSIONALCOMPONENTS:**expertlectures–seminars–webinars–industryinputs–socialaccountability–patriotism
TEXTBOOKS	1. J.C.Upadhyaya, 2019, Classical Mechanics, Himalaya Publishing house, Mumbai. 2. P.DuraiPandian, Laxmi Durai Pandian, Muthamizh Jayapragasam, 2005, Mechanics,6th revise dedition, S.Chand and Co. 3. D.S.Mathurand P.S.Hemne,2000,Mechanics,Revised Edition,S.Chand and Co. 4. Narayanamurthi,M.and Nagarathnam.N,1998, Dynamics.TheNationalPublishing,Chennai. 5. Narayanamurthi, M. and Nagarathnam, N, 198 Statics, Hydrostatics and Hydrodynamics,The National Publishers, Chennai.
REFERENCE BOOKS	1. GoldsteinHerbert,1980,ClassicalMechanics.U.S.A:Addisonand Wesely. 2. Halliday,DavidandRobert,Resnick,1995,PhysicsVol.I.NewAge,I nternational,Chennai. 3. Halliday,DavidRobertResnickandWalkerJearl,2001, Fundamentals of Physics,John Wiley,NewDelhi
WEBRESOU RCES	1. https://youtu.be/X4_K-XLUIB4 2. https://nptel.ac.in/courses/115103115 3. https://www.youtube.com/watch?v=p075LPq3Eas 4. https://www.youtube.com/watch?v=mH_pS6fruyg 5. https://onlinecourses.nptel.ac.in/noc22_me96/preview 6. https://www.youtube.com/watch?v=tdkFc88Fw-M 7. https://onlinecourses.nptel.ac.in/noc21_me70/preview

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
	75	100

COURSE OUTCOMES:
At the end of the course,the student will be able to:

COURSEOUTCOMES	**CO1**	Understand theNewton's Law of motion, under stand general theory of relativity, Kepler's laws and Realize the basic principles behind planetary motion
	CO2	Acquire the knowledge on the conservation laws
	CO3	Apply conservation law and calculate energy of various systems, understand and differentiate conservative and non-conservative forces
	CO4	Gain knowledge on rigid body dynamics and solve problems based on this concept
	CO5	Appreciate Lagrangian system of mechanics, apply D'Alemberts principle

MAPPING WITH PROGRAM OUTCOMES:

Map course outcomes**(CO)**for each course with program outcomes **(PO)**in the 3-point scale of STRONG (**S**),MEDIUM(**M**)and LOW(**L**).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	M	S	S
CO2	S	S	S	M	S	M	S	S	S	M
CO3	S	S	S	S	S	S	M	S	M	S
CO4	M	S	S	S	M	S	S	M	S	S
CO5	S	S	M	S	S	M	S	S	S	M

SEC-4

BIOMEDICAL INSTRUMENTATION	
Learning Objective: In this course, the student will get idea about design of medical instruments and component soft he Biomedical instrument system-get knowledge about characteristics of bio potential recording system -understand the operation and uses of ECG and EEG equipments-understand the application of Lasers and Computers in the Field of medicine.	
UNITS	**COURSEDETAILS**
UNIT-I	Design of medical instruments – Components of the Biomedical instrument system -Electrodes- Half cell potential – Purpose of electrodepaste-Types of electrodes –Transducers-Active transducers-Magnetic induction type transducers-Piezo electric type transducers
UNIT-II	Biopotential recorders-Characteristics of recording system-Writer And Pen damping system – Electro cardio graphy-Origin of cardiac potential- ECG lead configurations-Practical considerations for ECG recording.

UNIT-III	Electroencephalography- Origin of EEG-Brain waves-Placement Of electrodes- Recording setup- Analysis of EEG.
UNIT-IV	Computer sin medicine-Lasers in medicine – Endoscopes.
UNIT-V	ComputerTomography-MagneticresonanceImaging-Magneticresonance phenomenon-Magneticresonance spectros copy in vivo – Magnetic resonance imaging.
TEXTBOOKS	"**Biomedical instrumentation"** byDr.M.Arumugam, Anuradha publications, Chennai, 2008 Reprint" UnitI:ChapterII–Sections2.2,2.3,2.4(2.4.1-2.4.3),2.4.4,2.5 (2.5.1-2.5.3) UnitII:ChapterIV-Sections4.2,4.2.1,4.3(4.3.1,4.3.2,4.3.4) UnitIII:ChapterIV-Sections4.4,4.4.1-4.4.5)UnitIV:Chapter X-Sections10.2,10.3,10.4 UnitV:ChapterX-Sections10.7,10.10,10.10.1-10.10.3
REFERENCE BOOKS	1. Hand book of Biomedical instrumentation by R.S. Khandpur and Raghbir Khandpur,TMH,Secondedition,1987 2. Biomedical instrumentation and measurements by R. Ananda Natarajan, PHI India, Second edition,1995

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

SEC–5

ELECTRICAL WIRING	
Learning Objective: In this course, the student will understand the basics of AC circuits.learn about Electrical Installations. acquire the knowledge of Design of Simple Electrical Circuits.Will know about the guidelines for sub-circuits, fittings and Simple Wiring Schemes know about electrical protective devices and electrical estimation.	
UNITS	**COURSEDETAILS**
UNIT-I	**Basic Concepts :** Ohm's law – Kirchhoff's law – Biot-Savart Law – Electro magnetic induction:Faraday'slaw-Lenz'slaw-Super position theorem – Thevenin theorem – Norton's theorem - Reciprocity theorem-Star-Delta conversion.
UNIT-II	**Design Considerations of Electrical Installations:** Electric supply system – Three Phase four wire distribution system – Protection of electric installation against overload, short circuit, earth fault and electric shock-Single phase supply-Three phase, four wire supply-Neutral and Earthwire.
UNIT-III	**Electrical Wiring:** Introduction - List of Symbols - Supply Voltages-Service Connection - Interior wiring- Guidelines for sub-circuits and fittings-Simple Wiring Schemes-Two way control of lamps-Three way control of lamps.
UNIT-IV	**Design of Simple Electrical Circuits:** Electrical diagram – Methods of Representation for wiring diagram – Introduction to simple light and fan circuits-System of connection of appliances and accessories-Solved examples of light and fan circuits – Alarm circuits with relays

UNIT-V	**Electrical protective devices and Electrical estimation:** Fuses-Miniature circuit breaker(MCB)-Earth Leakage Circuit Breaker(ELCB)-Earthing-Computation of Energy consumed.
TEXTBOOKS	1. "**Basic Electrical Engineering**" by K. Uma Rao andA.Jayalakshmi, Sanguine Technical Publishers, Bangalore. 2014UnitI–1.3,1.5,2.2.1,2.7,2.7.1,2.7.2,3.6-3.8,3.10,3.11 UnitIII–6.1–6.9 UnitV–6.11–6.15 2. "**ElectricalDesignEstimatingandCosting**"byK.B.Rainaand S.K.Bhattacharya,NewAgeInternational(P)LtdPublishers,NewDelhi,2007 UnitII–4.1-4.3.3,4.3.5,4.5.7,4.5.8,4.8 UnitIV-1.3,1.4,2.1,2.2,2.3,2.7
REFERENCE BOOKS	1.V.K.Mehta,"PrinciplesofElectricalEngineeringandElectronics", S.Chand&CompanyLtd,2012. 2. Uppal S.L, "Electrical Wiring - Estimating and Costing", KhannaPublishers,Sixthedition2011.

METHODOFEVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

COURSE	**FOURTH SEMESTER–CORE THEORY 4**
COURSETITLE	**OPTICS and LASER PHYSICS**
CREDITS	**5**
COURSE OBJECTIVES	To provide an in-depth understanding of the basics of various phenomena in geometrical and wave optics;To explain the behavior of light in different mediums; To understand the differences in the important phenomenanamely interference, diffraction and Polarization and apply the knowledge in day to day life;to understand the design of optical systems and methods to minimsaberrations to understand the working and application soflaser
UNITS	**COURSEDETAILS**
UNIT-I	**LENS AND PRISMS:** Fermat's principle of least time – postulates of geometrical optics – thick and thin lenses – focal length, critical thickness, power and cardinal points of a thick lens – narrow angled prisms. *Lens*:aberrations:sphericalaberration,chromaticaberrations,coma,and astigmatism– curvature of the field – distortion – chromatic aberrations methods. *Prism*: dispersion, deviation, aberrations - applications rainbows andhalos,constant deviation spectroscope. *Eyepieces*: advantage of an eyepiece over a simple lens - Huygen'sand Ramsden's eyepieces, construction and working – merits and demerit softheeyepiece. *Resolvingpower*:Rayleigh'scriterionforresolution–limitof resolution for the eye – resolving power of, (i) Prism (ii) grating (iii)telescope

UNIT-II	**INTERFERENCE:** division of wave front, Fresnel's biprism - fringeswithwhitelight- divisionofamplitude:interferenceinthinfilmsdueto, (i) reflected light, (ii) transmitted light – colours of thin films applications–air wedge– Newton'srings. *Interferometers* : Michelson's interferometer – applications, (i)determination of the wave length of a monochromatic source of light, (ii) determination of the wavelength and separation D_1 and D_2 lines ofsodium light,(iii) determination of a thickness of a micasheet.
UNIT-III	**DIFFRACTION:** Fresnel's assumptions - zone plate - action of zoneplate for an incident spherical wave front - differences between azone plate and a convex lens -Fresnel type of diffraction - diffraction pattern due to a straight edge - positions of maximum and minimum intensities – diffraction due to a narrow slit - Fraunhofer type of diffraction- Fraunh ofer diffractionata single slit -plane diffraction grating- experiment to determine wavelengths - width of principal maxima.
UNIT-IV	**POLARISATION:** optical activity - optically active crystals - polarizerand analyser-double refraction – optic axis, principal plane –Huygens's explanation of double refraction in uniaxial crystals -polaroids and applications - circularly and elliptically polarized light -quarter wave plate - half wave plate - production and detection of circularly and elliptically polarized lights - Fresnel's explanation -specific rotation-Laurenthalf shade polarimeter- experiment to Determine specific rotator power.
UNIT-V	**LASERS:**general principles of lasers- properties of lasers action- spontaneous and stimulated emission - population inversion - opticalpumping - He-Ne laser (principle and working) - CO_2 laser (principleand working) semi conductor laser-laser applications- holography.
UNIT-VI	**PROFESSIONALCOMPONENTS:**expert lectures-seminars– webinars-industry inputs- social accountability-patriotism
TEXTBOOKS	1. Subramaniam.NandBrijlal,2014,Optics,25thEd,S.ChandandCo. 2. P.R.Sasikumar,2012,Photonics,PHIPvtLtd,NewDelhi. 3. V.Rajendran, 2012,EngineeringPhysics,TataMcGrawHill.
REFERENCEBOOKS	1. Sathyaprakash,1990,Optics,VIIedition,RatanPrakashanMandhir, NewDelhi. 2. AjoyGhatak,2009,Optics,4thedition,PHIPvtLtd,NewDelhi. 3. D.Halliday,R.ResnickandJ.Walker,2001,FundamentalsofPhysics, 6thedition,Willey,NewYork. 4. 7.JenkinsA.FrancisandWhite,2011,FundamentalsofOptics,4thediti on,McGrawHillInc.,NewDelhi.
WEBRESOURCES	1. https://science.nasa.gov/ems/ 2. https://www.youtube.com/watch?v=tL3rNc1G0qQandlist=RDCM UCzwo7UlGkb-8Pr6svxWo-LAandstart_radio=1andt=2472 3. https://science.nasa.gov/ems/ 4. https://imagine.gsfc.nasa.gov/educators/gammarayburs ts/imagine/index.html 5. http://www.thephysicsmill.com/2014/03/23/sky-blue-lord-rayleigh-sir-raman-scattering/

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

COURSE OUT COMES :
At the end of the course, the student will be able to:

COURSE OUTCOMES	**CO1**	Outline basic knowledge of method sof rectifying different defect sinlenses,articulate technological applications of eyepieces
	CO2	Discuss the principle of super position of wave,use these ideas to understand the wave nature of light through working of interferometer
	CO3	Extend the knowledge about nature of light through diffraction techniques; apply mathematical principle stoanaly see the optical instruments
	CO4	Interpret basic formulationofpolarizationandgainknowledgeaboutpolarimeter,appraiseitsusageinindustries
	CO5	Relatetheprinciplesofopticstovariousfields ofIR,Ramanand UVspectroscopyandunderstandtheirinstrumentationandapplicationin industries

MAPPINGWITHPROGRAMOUTCOMES:

Mapcourseoutcomes**(CO)**foreachcoursewithpramoutcomes**(PO)**inthe3-pointscaleofSTRONG (**S**),MEDIUM(**M**)and LOW(**L**).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	M	M	S	S	M	M
CO2	M	S	M	S	M	S	M	M	S	S
CO3	S	M	S	S	S	M	S	S	M	M
CO4	S	M	S	M	M	S	M	M	S	M
CO5	S	M	S	M	S	S	M	S	S	S

SEC-6

ENERGYPHYSICS	
LearningObjective: Togettheunderstandingoftheconventionalandnon-conventional energysources, theirconservation andstoragesystems.	
UNITS	**COURSEDETAILS**
UNIT-I	**INTRODUCTIONTOENERGYSOURCES:**RenewableEnergy-NonRenewable Energy - energy sources and their availability – conventional energy sources - non-conventional and renewableenergysources-comparison-meritsanddemerits.
UNIT-II	**SOLAR ENERGY:** solar energy Introduction - solar constant - solarradiation at the Earth's surface - solar radiation geometry - Solarradiationmeasurements–solarcooker–solarwaterheater–greenhouseeffect-solarcells.

UNIT-III	**WIND ENERGY: I**ntroduction –nature of the wind – basic principle ofwind energy conversion – basic components of Wind Energy Conversion Systems (WECS) – advantages and disadvantages of WECS–applications–tidalenergy
UNIT-IV	**BIOMASS ENERGY:**Introduction– classification– biomass conversion technologies –photosynthesis – fermentation – bio gas generation–classification of bio gas plants–advantages and disadvantages.
UNIT-V	**ENERGY STORAGE: I**mportance of energy storage- batteries - leadacid battery -nickel-cadmium battery – fuel cells – types of fuel cells –advantages and disadvantages of fuel cells–applications of fuel cells –hydrogen storage.
TEXT BOOKS	1. G.D.Rai, Non-Conventional Sources of Energy, Khanna Publishers,2009, 4th Edn. 2. S P Sukhstme,JK Nayak, Solar Energy, Principles of Thermal Collection and Storage,McGrawHill,2008,3rd Edn. 3. D P Kothari, K P Singal, Rakesh Rajan, PHI Learning Pvt Ltd, 2011, 2nd Edn.
REFERENCE BOOKS	1. John Twidelland Tony Weir, Renewable Energy Resources,Taylor and Francis, 2005,2nd Edn. 2. S.A.Abbasiand Nasema Abbasi, Renewable Energy sources and their environmental impact,PHI Learning Pvt.Ltd,2008. 3. M.P.Agarwal,SolarEnergy,S.ChandandCo.Ltd.,NewDelhi,1982 4. H.C.Jain,Non-Conventional Sources of Energy,Sterling Publishers,1986.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

SEC-7

MATERIALS SCIENCE	
Learning Objective: To learn imperfection sincrystals,deformation of materials and Testing of materials.To get knowledge on behavior of a material,under the action of light and their applications.To know the applications of crystal defects.	
UNITS	**COURSE DETAILS**
UNIT-I	**CRYSTAL IMPERFECTIONS:** Introduction – point defects: vacancies**(***problems***)**, interstitials, impurities, electronic defects – equilibrium concentration of point imperfections –application of point defects –line defects: edge dislocation, screw dislocation – surface defects: extrinsic defects – intrinsic defects: grain boundaries, tilt and twist boundaries, twin boundaries, stacking faults–volume defects–effect of imperfections.
UNIT-II	**MATERIAL DEFORMATION:**I ntroduction–elastic behavior of materials – atomic model of elastic behavior –modulus as a parameter in design–rubber like elasticity–in elastic behavior of materials– Relaxation process- visco elastic behavior of materials-spring.
UNIT-III	**PERMANENT DEFORMATION ANDS TRENGTHENING METHODS OF MATERIALS:** Introduction – plastic deformation: tensiles tress-strain curve–plastic deformation by slip–creep: mechanism of creep – Creep resistant materials – strengthening methods: strain hardening, Grain refinement– solid solution strengthening–precipitation strengthening.

UNIT-IV	**OPTICAL MATERIALS:** Introduction–optical absorption in metals, semi conductors and insulators–NLO materials and their applications display devices and display materials: fluorescence and phosphorescence – light emitting diodes – liquid crystal displays.
UNIT-V	**MECHANICAL TESTING:** Destructive testing: tensile test, compression test, hardness test – non destructive testing (NDT):radio graphic methods, ultra sonic methods–thermal methods of NDT: thermography – equipment used for NDT: metallurgical microscope
TEXTBOOKS	1. Material science and Engineering, Raghavan V, Prentice Hall of India, Sixth Edition, 2015 2. Materials science,V.Rajendran, Mc Graw Hill publications2011
REFERENCE BOOKS	1. William D. Callister, Jr., Material Science and Engineering – An Introduction, 8th Edition, John Wiley and Sons, Inc.,2007 2. W. Bolton, "Engineering materials technology", 3rd Edition, Butter worth and Heinemann, 2001. 3. Donald R. Askeland, Pradeep P.Phule ,"The Science and Engineering of Materials", 5th Edition, Thomson Learning, First Indian Reprint, 2007. 3. William F.Smith," Structure and Properties of Engineering Alloys", Mc-Graw- HillInc., U.S.A, 2nd edition,1993.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

COREPRACTIAL–II

COURSE	**EVEN SEMESTER CORE**
COURSE TITLE	**CORE PRACTICAL -II**
CREDITS	**3**
COURSE OBJECTIVES	Apply various Physics concepts to understand concepts of Light, electricity and Magnetism setup experimentation to verify the ories, quantify and analyse, able to do error analysis and correlate results.

Minimum of Fourteen Experiments from the list:

1. Refractive Index :Spectrometer A and D
2. Grating :Spectrometer-N and λ
3. Air Wedge :Thickness of wire
4. Newton's Rings :Radius and Wave length measurements
5. Carey Foster Bridge : Resistance and specific resistance
6. Carey Foster Bridge :Temperature coefficient
7. Potentiometer :Calibration of low range volt meter
8. Potentiometer :Calibration of ammeter
9. Potentiometer :Comparison of EMF's
10. Determination of B_H :Axialcoil

11. Determination of M	:Axialcoil
12. Determination of Mand B_H	:Tan C method
13. Spot Galvanometer	:Figure of Merit
14. Spot Galvanometer	: Charge sensitivity
15. Spot Galvanometer	: Comparison of EMF's
16. Spot Galvanometer	:Comparison of capacities
17. Owen's Bridge	:C1 / C2
18. DeSauty's Bridge	:C1 / C2

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

COURSE	**FIFTH SEMESTER – CORE THEORY 3**
COURSE TITLE	**ELECTRICITY, MAGNETISM AND ELECTRO MAGNETISM**
CREDITS	**5**
COURSE OBJECTIVES	To classify materials based on their electrical and magnetic properties. To analyse the working principles of electrical gadgets.To understand the behaviour of dc, ac and transient currents. To know about the communication by electro magnetic waves.

UNITS	COURSEDETAILS
UNIT-I	**CAPACITORS AND THERMO ELECTRICITY:** capacitor-principle – capacitance of spherical and cylindrical capacitors – capacitance of a parallel plate capacitor (with and without dielectric slab) – effect of dielectric –Carey Foster bridge – temperature coefficient of resistance – See beck effect – laws of thermo emf – Peltier effect –Thomson effect- thermo electric diagrams-uses of thermo electric diagrams – thermo dynamics of thermo couple - determination of Peltier and Thomsoncoefficients.
UNIT-II	**MAGNETIC EFFECTS OF CURRENT:** Biot and Savart's law – magnetic induction due to circular coil-magnetic induction due to solenoid – Helmholtz tangent galvanometer –force on a current element by magnetic field – force between two infinitely long conductors – torque on a current loop in a field - moving coilgalvano meter – damping correction – Ampere's circuital law –differential form-divergence of magnetic field-magnetic induction due to toroid.

UNIT-III	**MAGNETISM AND ELCTROMAGNETICINDUCTION:**magnetic induction B–magnetization M-relationbetween B,Hand M–magnetic susceptibility – magnetic permeability – experiment to draw B-H curve – energy loss due to hysteresis - Importance of hysteresis curves–Faradayand Lenzlaws–vector form –self-induction–coefficient of self- inductance of solenoid–Anderson's method–mutual induction–coefficient of mutual inductance between two coaxial solenoids – coefficient of coupling – earth inductor-determination of angle of dip(Φ)
UNIT-IV	**TRANSIENT AND ALTERNATING CURRENTS:** growth and decay of current in a circuit containing resistance and inductance – growth and decay of charge in a circuit containing resistance and capacitor –growth and decay of charge in an LCR circuit (expressions for charge only) – peak, average and rms values of ac – LCR series and parallel circuits – resonance condition – Q factor – power factor.
UNIT-V	**MAXWELLSEQUATIONSANDELECTROMAGNETICWAVES:** Max well's equations in vacuum, material media–physical significance of Maxwell'sequations – displacement current–plane electro magnetic waves in free space – velocity of light–Poynting vector – electro magnetic waves in a line arhomogenous media-refractive index.
UNIT-VI	**PROFESSIONAL COMPONENTS:** expert lectures – seminars– webinars – industry inputs – social accountability – patriotism
TEXTBOOKS	1. Murugeshan.R.,-Electricity and Magnetism,8th Edn, 2006, S.Chand and Co, NewDelhi.\ 2. Sehgal D.L.,Chopra K.L,Sehgal N.K.,-Electricity and Magnetism, 3. Sultan Chand and Sons, NewDelhi. 4. M. Narayanamurthy and N. Nagarathnam, Electricity and Magnetism, 4th Edition. 5. National Publishing Co.,Meerut.
REFERENCE BOOKS	1. Brijlal and Subramanian, Electricity and Magnetism, 6thEdn.,Ratan and Prakash,Agra. 2. Brijlal,N.Subramanyan and Jivan Seshan, Mechanics and Electrody namics (2005), 3. Eurasia Publishing House(Pvt.)Ltd., NewDelhi. 4. DavidJ.Griffiths,Introduction to Electro dynamics, 2nd Edn. 1997, Prentice Hall of India Pvt. Ltd.,NewDelhi 5. D.Halliday,R.ResnikandJ.Walker-Fundamentals of Physics,6th Edn., Wiley, NY,2001.
WEB RESOURCES	1. https://www.edx.org/course/electricity 2. https://www.udemy.com/courses/electricity 3. https://www.edx.org/course/magnetism 4. http://www.hajim.rochester.edu/optics/undergraduate/courses.html

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

COURSE OUTCOMES:
At the end of the course, the student will be able to:

COURSEOUTCOMES	**CO1**	Describe various thermo-electric effects and their properties.
	CO2	Apply Biot and Savart law to study the magnetic effect of electric current.
	CO3	Use Faraday and Lenz laws in explaining self and mutual inductance.
	CO4	Analyze the time variation of current and potential difference in AC circuits.
	CO5	Relate different physical quantities used to explain magnetic properties of materials.

MAPPING WITH PROGRAM OUTCOMES:

Map course out comes **(CO)** for each course with program out comes **(PO)** in the 3-point scale of STRONG (**S**),MEDIUM(**M**) and LOW(**L**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	S	M	S	S	S	M	M	S	M

COURSE	**FIFTH SEMESTER- CORE**
COURSE TITLE	**ATOMIC and NUCLEAR PHYSICS**
CREDITS	**5**
COURSE OBJECTIVES	To make students understand the development of atommodels, quantum numbers, coupling schemes and analysis of magnetic moments of an electrons; To gain knowledge on excitation andionization potentials, splitting of spectral lines in magnetic and electric fields; To get knowledge on radioactive decay; To know the concepts used in nuclear reaction; to understand the quark model of classification of element aryparticles.
UNITS	**COURSEDETAILS**
UNIT-I	**VECTOR ATOMMODEL:** Introduction to atommodel-vector atommodel – electron spin –spatial quantisation- quantum numbers associated with vector atom model -L-S and J-J coupling – Pauli's exclusion principle-magnetic dipole moment due to orbital motion and spin motion of the electron -Bohr magnetron -Stern-Gerlach experiment-selection rules-intensity rule.

UNIT-II	• **ATOMIC SPECTRA:** Origin of atomic spectra – excitation andionization potentials – Davis and Goucher's method – spectral termsandnotations–finestructureofsodiumD-lines–Zeemaneffect–Larmor's theorem – quantum mechanical explanation of normal Zeemaneffect–anomalous Zeemaneffect (qualitative explanation)– Paschen – Back effect– Stark effect.
UNIT-III	**RADIOACTIVITY:**Discovery of radio activity–natural radio activity properties of alpha rays, beta rays and gamma rays – Geiger-Nuttal law – alpha particle spectra – Gammow's theory of alphadecay (qualitative study) – beta ray spectra – neutrino theory of betadecay –nuclear is omerism –internal conversion –non-conservation of parity in weak inter actions.
UNIT-IV	• **NUCLEAR REACTIONS:** Conservation laws of nuclear reaction – Q- value equation for a nuclear reaction – threshold energy –scattering cross section–artificial radio activity–application of radio isotopes – classification of neutrons – models of nuclear structure–liquid drop model–shell model.
UNIT-V	• **ELEMENTARY PARTICLES:** Classification of element aryparticles • –fundamental interactions– element aryparticle quantum numbers • –iIsospin and strangness quantum number – Conservation laws andsymmetry – quarks – quark model (elementary ideas only) –discovery of cosmic rays – primary and secondary cosmic rays –latitude effect–altitude effect.
UNIT-VI	• **PROFESSIONAL COMPONENTS:**Expert lectures–seminars– webinars–industry inputs – social accountability–patriotism
TEXTBOOKS	• R.Murugesan, Modern Physics, S.Chand and Co**.(**Allunits**)** (Units Iand II-Problems) • Brijlal and N.Subrahmanyam, Atomic and Nuclear Physics, S.Chand and Co.(Allunits) • J.B.Rajam, Modern Physics, S.Chand and Co. • Sehgaland Chopra, Modern Physics, Sultan Chand, New Delhi • ArthurBeiser–Concept of Modern Physics, Mc Graw Hill Publication, 6th Edition.
REFERENCE BOOKS	• Perspective of Modern Physics, Arthur Beiser, Mc GrawHill. • Modern Physics,S.Ramamoorthy,National Publishing and Co. • Laser and Non-Linear Optics by B.B.Laud, Wiley Easter Ltd., NewYork,1985. • Tayal,D.C.2000–Nuclear Physics, Edition, Himalaya Publishing House, Mumbai. • Irving Kaplan(1962) Nuclear Physics, Second Edition, Oxford and IBH Publish and Co, NewDelhi. • J.B.Rajam–Atomic Physics,S.Chand Publication,7th Edition. • Roy and Nigam,–Nuclear Physics (1967) First edition,Wiley Eastern Limited, NewDelhi.

WEB RESOURCES	• http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html • https://makingphysicsfun.files.wordpress.com/2015/01/photoelectric-effect.pptx • https://www.khanacademy.org/science/physics/quantum-physics/in-in-nuclei/v/types-of-decay • https://www.khanacademy.org/science/in-in-class-12th-physics-india/nuclei

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

COURSE OUTCOMES:

At the end of the course, the student will be able to:

COURSEOUTCOMES	**CO1**	List the properties of electrons and positive rays,define specific charge of positive rays and know about different mass spectro graphs.
	CO2	Outline photoelectric effect and the terms related to it, State laws of photo electricemission, Explain experiments and applications of photo electric effect,Solve problems based on photo electric equation.
	CO3	Explain different atommodels, Describe different quantum numbers and different coupling schemes.
	CO4	Differentiate between excitation and ionization potentials, Explain Davis and Goucher's experiment, Apply selection rule, Analyse Paschen – Back effect, Compare Zeeman and Stark effect.
	CO5	Understand the condition for production of laser, Appreciate various properties and applications of lasers.

MAPPING WITH PROGRAM OUTCOMES:

Map course out comes **(CO)** for each course with program out comes **(PO)** in the 3-point scale of STRONG (**S**),MEDIUM(**M**)and LOW(**L**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	S	S	M	S	M
CO2	S	S	M	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	M	S	S	S
CO4	M	S	S	S	S	M	S	M	M	M
CO5	S	M	S	S	M	S	S	M	M	S

COURSE	**FIFTH SEMESTER– CORE**
COURSE TITLE	**ANALOG AND COMMUNICATION ELECTRONICS**
CREDITS	**5**

COURSE OBJECTIVES	To study the design, working and applications of semi conducting devices. To construct various electronic circuits. To study them in details.To study the basis of audio and video communication system and the aspects of satellite and Fibre Optic Communications.
UNITS	**COURSE DETAILS**
UNIT-I	**DIODES:** diode characteristics– rectifiers-clippercircuits,clamping circuits. half wave rectifier, center tapped and bridge full wave rectifiers, calculation of efficiency an dripplefactor. DC power supply: Block diagram of a power supply, qualitative description of shuntcapacit or filter, Zenerdiodeas voltage regulator, temperature coefficient of Zenerdiode.
UNIT-II	**TRANSISTORAMPLIFIERS:**Transistorconfigurations:CB,CECCmodes-I-V characteristics and hybrid parameters-DCloadline-Q point self-bias – RC coupled CE amplifier -power amplifiers – classificationofpoweramplifiers: A,B,C- pushpullamplifiers- tunedamplifiers.
UNIT-III	**TRANSISTOR OSCILLATORS:** Feedback amplifier - principle of feedback, positive and negative feedback of voltage and current gain, advantages of negative feedback - Barkhausen's criterion.Transistoroscillators:Hartely,Colpitt,Phaseshiftoscillatorswith mathematicalanalysis.
UNIT-IV	**OPERATIONAL AMPLIFIERS:** Differential amplifiers **–** OPAMP characteristics -IC 741 pin configuration **–** inverting and non-inverting amplifiers- unity follower-summing and difference amplifiers- differentiator and integrator- astable multivibrator (squarewavegenerator)- monostable vibrator
UNIT-V	**MODULATION AND DEMODULATION:** Theory of amplitude modulation-frequency modulation-comparison of AM and FM-phase modulation-sampling theorem-pulse width modulation- pulse modulation systems: PAM,PPM, and PCM-demodulation: AM and FM detection-duper heterodyne receiver(block diagram)
UNIT-VI	**PROFESSIONAL COMPONENTS:** Expert lectures- seminars– webinars- industry inputs- social accountability-patriotism
TEXT BOOKS	1. V.K.Mehta-Principles of Electronics,S.ChandandCo.Ltd.,2004. 2. V.Vijayendran - Integrated Electronics, S.Vishwanathan Publishers, Chennai. 3. B.L.Theraja – A Text Book of Electrical Technology. 4. John D. Ryder-Electronic fundamentals and Applications. 5. Malvino -Electronic Principles,Tata Mc Graw Hill.
REFERENCE BOOKS	1. B. Grob- Basic Electronics,6th edition, McGrawHill,NY,1989. 2. Herbert Taub and Donald schilling - Digital Integrated Electronics, McGraw Hill, NY. 3. Ramakant A.-Opamp principles and linearintegratedcircuits,Gaykward 4. BagdeandS.P.Singh-ElementsofElectronics. 5. MillmanandHalkias-IntegratedElectronics,TataMcGrawHill.

WEB RESOURCES	1. https://www.queenmaryscollege.edu.in/eresources/undergraduateprogram/py157 2. www.ocw.mit.edu>...>CircuitsandElectronics 3. www.ocw.mit.edu>...> Introductory Analog ElectronicsLaboratory 4. https://www.elprocus.com>semiconductordevices 5. https://www.britannica.com>technology

METHODOFEVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

COURSE OUTCOMES:

At the end of the course,the student will be able to:

COURSEOUTCOMES	**CO1**	Explain the basic concepts of semi conductors devices.
	CO2	know and classify the basic principles of bia sing and transis to ramplifiers
	CO3	Acquire the fundamental concepts of oscillators.
	CO4	Understand the working of operational amplifiers
	CO5	Learn and analyze the operations of sequential and combinational digital circuits

MAPPING WITH PROGRAM OUTCOMES:

Map course out comes **(CO)** for each course with program out comes **(PO)** in the 3-point scale of STRONG (**S**),MEDIUM(**M**)and LOW(**L**).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	S	S	M	S	M	M	S	M	M	M
CO3	M	M	S	L	S	S	L	S	S	S
CO4	M	S	S	S	S	S	S	M	L	M
CO5	S	M	S	S	M	M	S	M	M	S

ELECTIVE COURSE-1

MATHEMATICAL PHYSICS	
Learning Objective: To understand higher mathematical concepts which are applied to solve problems in Physics and similar situations	
UNITS	**COURSEDETAILS**
UNIT-I	**MATRICES:** Types of matrices-symmetric, Hermitian, unitary and orthogonal matrices- characteristic equation of a matrix - Eigen values and Eigen vectors of a matrix-Cayley-Hamiltontheorem-inverse of matrix by Cayley- Hamilt on theorem– similarity transformations- diagonalization of 2x2 realsymmetricmatrices.

UNIT-II	**VECTORCALCULUS:**Vector differentiation- directionalderivatives -definitionsandPhysicalsignificanceofgradient,divergence,curl-Laplace operators- vector identities – line, surface and volume integrals-statement,proof and simple problems for Gauss's diver gence the orem, Stoke's the orem,Green'stheorem.
UNIT-III	**ORTHOGONALCURVILINEARCOORDINATES:**Tangentbasis vectors-scalefactors-unit vector sincylindrical and spherical co ordinate systems- gradient to fascalar- divergence and curlofa vector- Laplacian in these coordinate systems.
UNIT-IV	**FOURIER SERIES:**periodic functions- Dirichlet's conditions-general Fourier series – even and odd functions and their Fourier expansions- Fourier cosine and sine-half range series-change of length of interval. Fourier analysis of square wave, saw-tooth wave,half wave / full wave rectifier wave forms. **FOURIERTRANSFORMS**:Fourier Integralthe orem (Statement only)- Fourier, Fourier sine and Fourier cosine transforms,-Fourier transform of single pulse-trigonometric, exponential and Gaussian functions-inverse Fourier transform- convolution the orem.
UNIT-V	**APPLICATIONSOFPARTIALDIFFERENTIALEQUATIONS(PDE):** PDEfortransversevibrationsinelasticstrings(onedimensionalwaveequation) -one dimensional heat flow equation – solutions to thesePDE'sbymethodofseparationofvariables–problemsbasedon boundaryconditionsandinitialconditions.
TEXTBOOKS	1. Advanced Engineering Mathematics, ErwinKreyszig,2008,WileyIndia. 2. Mathematical Physics – P. K. Chattopadhyay, New Age International Publishers. 3. Mathematical Physics-B.D.Gupta. 4. Mathematical Physics-H.K.Das,S.Chand and Co,New Delhi.
REFERENCE BOOKS	1. Fourier Analysis by M.R.Spiegel, 2004,Tata Mc Graw-Hill. 2. Engineering Mathematics III-B, M.K.Venkataraman, 3. Applied Mathematics for Scientists and Engineers, Bruce R.Kusse and ErikA.Westwig, 2nd Ed, WILEY-VCH Verlag, 2006. 4. Vector space and Matrices-J.C.Jain,NarosaPublishingHousePvt.Ltd.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

ABILITY ENHANCEMENT COMPULSORY COURSE

EMPLOYABILITY SKILLS	
Learning Objective: To enrich the Employability Skills by imparting Reasoning skills, Aptitude skills and General Knowledge.	
UNITS	**COURSEDETAILS**
UNIT-I	Quantitative Aptitude-Averages,Percentage,Profit & Loss, Ratio & Proportion,Time & Work,Time & Distance,Clock
UNIT-II	Quantitative Aptitude-Problems on Ages, Boat & Stream, Simple Interest,Compound Interest, Area, Partnerships.
UNIT-III	Verbal Reasoning-Analogy, Classification, Series, Coding & Decoding, Blood Relations,Direction Sense Test.

UNIT-IV	Verbal Reasoning-Number Test, Ranking &Time sequence Test, Alphabet Test, Logical Venn Diagrams.
UNIT-V	General Knowledge: Abbreviations, Acronyms, Famous Personalities, Important Days,Capital Cities, Currencies, Books and Authors, Inventions.
TEXTBOOKS	1. Verba l& Non Verbal Reasoning- R.S.Aggarwal 2. Quantitative Aptitude- R.S. Aggarwal

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

COURSE	**SIXTH SEMESTER – CORE**
COURSETITLE	**QUANTUM MECHANICS AND RELATIVITY**
CREDITS	**5**
COURSEOBJECTIVES	To understand the theory of relativity, its postulates and the consequences.To learn the importance of transformation equations and also to differentiate between special and general theory of relativity.To interpret the wave theory of matter with various the oretical and experimental evidences. To derive and use Schrodinger's wave equation and also learn about various operators.To solve Schrodinger's wave equation for simple problems and analyse to understand the solutions.

UNITS	COURSE DETAILS
UNIT-I	**SPECIAL THEORY OF RELATIVITY:** Michelson-Morley experiment–frames of reference – Galilean Relativity-postulates of special theory of relativity– Lorentz transformation–consequences – time dilation-concept of simultaneity – Doppler effect – length contraction-variation of mass with velocity – Einstein's mass-energy relation-relativistic momentum-energy relation
UNIT-II	**TRANSFORMATION RELATIONS:**Transformation of velocity, mass, energy and momentum – four vector – invariance under transformation-Lorentz transformation and velocity addition equation sinterms of hyperbolic functions. **GENERAL THEORY OF RELATIVITY:** Inertial and Gravitational mass- Principle of equivalence – Experimental evidences for General theory of Relativity
UNIT-III	**PHOTONS AND MATTER WAVES:** Difficulties of classical physics and origin of quantum theory- black body radiation – Planck'slaw – Einstein's photo electric equation–Compton effect–pair production – De Broglie waves – phase velocity and group velocity Davisson and Germer's experiment-uncertainty principle- consequences-illustration of Gammaray microscope.
UNIT-IV	**OPERATORS AND SCHRÖDINGEREQUATION:**Postulates of quantum mechanics – Wave function and its interpretation – Schrödinger's equation -linear operators - Eigenvalue - Hermitian operator - properties of Hermitian operator- observable - operators for position, linear Momentum,angular momentum components-commutator algebra -commutate or between these operators - expectation values of position and momentum- Ehrenfest theorem.

UNIT-V	**SOLVING SCHRÖDINGER EQUATION FOR SIMPLE PROBLEMS:***one-dimensionalproblems*:(i)particleinabox,(ii)
	barrierpenetration problem – quantummechanicaltunneling,(iii)linearharmonicoscillator. *higherdimensionalproblems*:(i)Rigidrotator(qualitative),(ii) Hydrogenatom(qualitative).
UNIT-VI	**PROFESSIONAL COMPONENTS:**Expertlectures-seminars–webinars-industryinputs-socialaccountability-patriotism
TEXT BOOKS	1. ModernPhysics,R.Murugeshan,KiruthigaSivaprasath,S.Chand andCo.,17th RevisedEdition, 2014. 2. ConceptsofModernPhysics,A.Beiser,6th Ed.,McGraw-Hill,2003. 3. SpecialTheoryofRelativity,S.P.Puri,PearsonEducation,India, 2013. 4. QuantumMechanics,GhatakandLoganathan,MacmillanPublications. 5. Quantummechanics-SatyaprakashandSwatiSaluja.KedarNath Ram Nath and Co.
REFERENCE BOOKS	1. FundamentalsofModernPhysics,PeterJ.Nolan,1st Edition, 2014, byPhysics 2. QuantumMechanics,V.Devanathan,NarosaPub.House,Chennai,2005. 3. Quantum Mechanics, V.K. Thangappan, New AgeInternational,NewDelhi. 4. A Text Book of Quantum Mechanics, Mathews andVenkatesan,TataMcGrawHill,NewDelhi. 5. IntroductiontoQuantumMechanics,PaulingandWilson,McGraw HillCo.,NewYork.
WEB RESOURCES	1. http://hyperphysics.phy-astr.gsu.edu/hbase/qapp.html 2. https://swayam.gov.in/nd2_arp19_ap83/preview 3. https://swayam.gov.in/nd1_noc20_ph05/preview 4. https://www.khanacademy.org/science/physics/special-relativity/minkowski-spacetime/v/introduction-to-special-relativity-and-minkowski-spacetime-diagrams

METHODOFEVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

COURSE OUTCOMES:

At the end of the course,the student will be able to:

COURSE OUTCOMES	**CO1**	Understand various postulates of special theory of relativity.
	CO2	Appreciate the importance of transformation equations and also the general theory of relativity..
	CO3	Realise the wave nature of matter and understand its importance
	CO4	Derive Schrodingere quation and also realize the use of operators.
	CO5	Apply Schrödingere quation to simple problems.

MAPPING WITH PROGRAM OUTCOMES:

Map course out comes **(CO)** for each course with program out comes **(PO)** in the 3-point scale of STRONG (**S**),MEDIUM(**M**)and LOW(**L**).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	S	S	M	S	M	M	S	M	M	M
CO3	M	M	S	M	S	S	M	S	S	S
CO4	M	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	M	M	S	M	M	S

COURSE	**SIXTH SEMESTER–CORE**
COURSETITLE	**SOLIDSTATE PHYSICS**
CREDITS	4
COURSEOBJECTIVES	To understand constituents, properties and models of nucleus. To give reason for radioactivity and study their properties. To learn about the principles of various particle detectors and accelerators. To acquire knowledge on different types of nuclear reactions and their applications.To know the reason for cosmic rays and their effect on the surface of earth and also understand the classification of elementary particles.
UNITS	**COURSE DETAILS**
UNIT-I	**BONDING IN SOLIDS, CRYSTAL STRUCTURE:** types of bonding- ionic bonding – bond energy of NaCl molecule –covalent bonding – metallic bonding – hydrogen bonding – Van-der-Waals bonding – crystallattice–latticetranslationalvectors–latticewithbasis–unitcell– Bravais'lattices–Millerindices–procedureforfindingthem–packing of BCC and FCC structures – structures of NaCl anddiamond crystals –reciprocal lattice – reciprocal lattice vectors –properties – reciprocal lattices to SC, BCC and FCC structures – Brillouinzones– X-rays– Bragg'slaw(simpleproblems)– experimental methods: Laue method,powder method and rotating crystal method
UNIT-II	**ELEMENTARY LATTICE DYNAMICS:**lattice vibrations and phonons: linear monoatomic and diatomic chains. acoustical andoptical phonons –qualitative description of the phonon spectrum insolids –Dulong and Petit's Law – Einstein and Debye theories of specific heat of solids- T^3 law (qualitativeonly)–properties of metals – classical free electron theory of metals (Drude-Lorentz) – Ohm's law–electrical an thermal conductivities- Weidemann- Franz'law –Sommerfeld's quantum free electron theory (qualitative only) –Einstein'stheoryofspecificheatcapacity.
UNIT-III	**MAGNETIC PROPERTIES OF SOLIDS:** permeability, susceptibility,relation between them – classification of magnetic materials –propertiesofdia,para,ferro,ferriandantiferro magnetism- Langevin'stheoryofdiamagnetism- Langevin'stheoryofparamagnetism- Curie-Weisslaw-Weisstheoryofferromagnetism(qualitativeonly)-
	Heisenberg's quantum theory of ferromagnetism – domains – discussionofB-Hcurve–hysteresisandenergyloss- softandhardmagnets–magneticalloys.

UNIT-IV	**DIELECTRIC PROPERTIES OF MATERIALS:** polarization andelectric susceptibility –local electric field of an atom – dielectricconstantandpolarisability– polarizationprocesses:electronicpolarization– calculation of polarisability – ionic, orientational andspace charge polarization – internal field –Clausius-Mosotti relation – frequencydependenceofdielectricconstant–dielectricloss– effectoftemperatureondielectricconstant– dielectricbreakdownanditstypes – classical theory of electric polarisability –normal andanomalousdispersion– CauchyandSellmeirrelations–Langevin-Debyeequation–complexdielectricconstant– opticalphenomena.Application–plasmaoscillations– plasmafrequency–plasmons,
UNIT-V	**FERRO ELECTRIC and SUPER CONDUCTING PROPERTIES OF MATERIALS:** *Ferroelectric effect*: Curie-Weiss Law – ferroelectric domains, P-E hysteresis loop – *elementary band theory:*Kronig-Penny model – band gap(no derivation) – conductor, semiconductor(PandNtype)andinsulator–conductivity of semi conductor–mobility – Halleffect–measurement of conductivity (four probe method)-Hallcoefficient. *Superconductivity:* experimental results –critical temperature - criticalmagneticfield–Meissnereffect–type-Iandtype-IIsuperconductors – London's equation and penetrationdepth–isotopeeffect–ideaof BCS theory (no derivation)
UNIT-VI	**PROFESSIONAL COMPONENTS:** Expert lectures–seminars– webinars–industry inputs– social accountability– patriotism
TEXTBOOKS	1. Introduction to Solid State Physics, Kittel, WilleyEasternLtd(2003). 2. Solidstate Physics, RitaJohn,1st edition,Tata Mc Graw Hill publishers (2014). 3. Solid State Physics, RL Singhal, Kedarnath Ram Nath and Co., Meerut (2003) 4. Elements of Solid State Physics, J.P.Srivastava, 2nd Edition, 2006, Prentice –Hall of India 5. Introduction to Solids, LeonidV.Azaroff,2004, Tata Mc-Graw Hill 6. Solid State Physics, N.W.Ashcroft and N.D.Mermin, 1976, Cengage Learning 7. Solid-statePhysics,H.IbachandH.Luth,2009,Springer 8. ElementarySolidStatePhysics,1/eM.AliOmar,1999,PearsonIndia 9. SolidStatePhysics, M.A.Wahab, 2011,NarosaPublishingHouse,ND
REFERENCE BOOKS	1. Puri and Babber– Solid State Physics– S.Chand and Co. NewDelhi. 2. Kittel-Introduction to solid state physics,Wiley and Sons, 7th edition. 3. Raghavan-Materials science and Engineering, PHI 4. Azaroff-Introduction to solids,TMH 5. S. O.Pillai –Solid State Physics, Narosa publication 6. A.J. Dekker-Solid State Physics,Mc Millan IndiaLtd. 7. Elements of Solid State Physics,J.P.Srivastava, 2nd Edition, 2006, Prentice-HallofIndia
WEBRESOURCES	1. https://nptel.ac.in/courses/115105099/ 2. https://nptel.ac.in/courses/115106061/

METHOD OFEVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

COURSE OUTCOMES:
At the end of the course, the student will be able to:

COURSE OUTCOMES	**CO1**	Classify the bonding and crystal structure also learn about the crystal structure analysis using Xray diffraction.
	CO2	Understand the lattice dynamics and thus learn the electrical and thermal properties of materials.
	CO3	Give reason for classifying magnetic material on the basis of their behaviour.
	CO4	Comprehend the dielectric behavior of materials.
	CO5	Appreciate the ferro electric and super conducting properties of materials.

MAPPING WITH PROGRAM OUTCOMES:

Map course out comes **(CO)** for each course with program out comes **(PO)** in the 3-point scale of STRONG (**S**),MEDIUM(**M**)and LOW(**L**).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	S	S	S	M	S	S
CO2	M	S	M	S	M	M	S	M	M	M
CO3	S	M	S	M	S	M	M	S	S	S
CO4	S	S	S	S	M	S	S	M	M	M
CO5	S	M	M	S	S	M	S	M	M	S

COURSE	**SIXTH SEMESTER– DISCIPLINE SPECIFIC ELECTIVE**
COURSETITLE	**DIGITAL ELECTRONICS AND MICRO PROCESSOR 8085**
CREDITS	4
COURSE OBJECTIVES	To learn all types of number systems,Boolean algebra and identities, digital circuits for addition and subtraction,flip-flops,registers,counters.To get the knowledge on fundamentals of 8085 architecture, instruction sets and simple programs.
UNITS	**COURSE DETAILS**
UNIT-I	decimal, binary, octal, hexadecimal numbers systems and their conversions– codes: BCD, gray and excess - 3codes –code conversions - complements (1's,2's,9'sand10's)-binary addition,binary subtraction using 1's and 2's complement methods-Boolean laws- De-Morgan's theorem- basic logicgates-universal logic gates

	(NAND and NOR) - standard representation of logic functions (SOPandPOS) – minimization techniques (Karnaughmap: 2, 3, 4variables).
UNIT-II	adders, half and full adder –sub tractors, half and full sub tractor – 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),BCD to seven segment decoder.
UNIT-III	flip-flops: S-R Flip-flop , J-K Flip-flop, T and D type flip-flops, master-slave flip-flop, truth tables, registers:- serial in serial out and parallelin and parallelout– countersasynchronous:-mod-8,mod-10,synchronous-4-bitandringcounter– generalmemoryoperations,ROM, RAM (static and dynamic), PROM, EPROM, EEPROM,EAROM. IC - logic families: RTL, DTL, TTL logic, CMOS NAND andNOR Gates, CMOS Inverter, Programmable Logic Devices – Programmable Logic Array (PLA),Programmable Array Logic(PAL).
UNIT-IV	8085 Micro processor: introduction to microprocessor - INTEL 8085 architecture – register organization-pin configuration of 8085, interrupts and its priority - Program Status Word (PSW)-instruction set of 8085 - addressing modes of 8085-assembly language programming using 8085 -programmes for addition (8-Bit and 16-Bit), subtraction (8-Bitand16-Bit), multiplication (8-Bit),division (8-Bit) - largest and smallest number in an array - BCD to ASCII and ASCII to BCD.
UNIT-V	I/O Interfaces: serial communication interface (8251-USART) – programmableperipheralinterface(8255-PPI)– programmableinterval timers (8253) - keyboard and display (8279), DMA controller(8237).
UNIT-VI	**PROFESSIONAL COMPONENTS:** Expert lectures- seminars– webinars- industry inputs- social accountability- patriotism
TEXTBOOKS	1. M.Morris Mano,"DigitalDesign"3rdEdition,PHI,NewDelhi. 2. RonaldJ.Tocci."DigitalSystems-Principles and Applications" 6/e.PHI. NewDelhi.1999.(UNITSItoIV) 3. S.Salivahana and S. Arivazhagan- Digital circuits and design 4. Micro processor Architecture, Programming and Applications with the 8085 – Penram International Publishing, Mumbai.- Ramesh S.Gaonakar 5. Micro computer Systems the 8086/8088 family - YU-Cheng Liu and Glen SA
REFERENCE BOOKS	1. Herbert Taub and Donald Schilling."Digital Integrated Electronics" Mc GrawHill.1985. 2. S.K.Bose."DigitalSystems".2/e.NewAgeInternational.1992. 3. D.K.Anvekarand B.S.Sonade. "Electronic Data Converters: Fundamentals and Applications".TMH.1994. 4. Malvino and Leach. "Digital Principles and Applications". TMG Hill Edition 5. Micro processors and Interfacing- Douglas V.Hall 6. Micro processor and Digital Systems- Douglas V.Hall

WEBRESOURCES	1. https://youtu.be/-paFaxtTCkI 2. https://youtu.be/s1DSZEaCX_g

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

COURSE OUTCOMES:
At the end of the course,the student will be able to:

COURSE OUTCOMES	**CO1**	Learn about number systems, Boolean algebra, logical operation and logic gates
	CO2	Understand the working of adder, subractors, multiplexers and demultiplexers.
	CO3	Get knowledge on flip-flops and storage devices.
	CO4	Gain inputs on architecture of microprocessor 8085.
	CO5	Develop program writing skills.on microprocessor 8085.

MAPPINGWITHPROGRAMOUTCOMES:

Map course out comes **(CO)** for each course with program out comes **(PO)** in the 3-pointscaleofSTRONG (**S**),MEDIUM(**M**)and LOW(**L**).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	S	S	S	M	S	S
CO2	M	S	M	S	M	M	S	M	M	M
CO3	S	M	S	M	S	M	M	S	S	S
CO4	S	S	S	S	M	S	S	M	M	M
CO5	S	M	M	S	S	M	S	M	M	S

ELECTIVE COURSE-2

NANOSCIENCEANDNANOTECHNOLOGY	
LearningObjective: Thiscourseaimstoprovideanoverallunderstandingof Nanoscience andNanotechnologyandintroducesdifferenttypesofnanomaterials,theirproperties,fabrication methods,characterizationtechniquesandarangeofapplications.	
UNITS	**COURSEDETAILS**
UNIT-I	**NANOSCIENCEANDNANOTECHNOLOGY:**Nanoscale-nature and nano structures-nano structures:0D,1D,2D-surface to volume ratio-size effect – excitons-quantum confinement-metal based nan oparticles (metal and metaloxide)-nano composites (non-polymer based)- carbon nano structures- fullerene-SWCNTandMWCNT

UNIT-II	**PROPERTIES OF NANO MATERIALS:**Introduction-Mechanical behavior -elastic properties - hardness and strength - ductility and tough ness -super plastic behavior – optical properties – surface Plasmon resonance-electricalproperties-dielectricmaterialsand properties– magneticproperties– superparamagnetism–electro chemical properties- properties of CNTs.
UNIT-III	**FABRICATION METHODS AND VACUUM TECHNIQUES:** Top- down and bottom- upapproaches- electro chemical method-chemical and physical vapour depositions (CVD and PVD) - plasma arc discharge - sputtering- ther male vaporation-pulsed laser deposition- ball milling – lithography:photo lithography-e-beam lithography-sol-gel methods – synthesis of CNT.
UNIT-IV	**CHARACTERIZATION TECHNIQUES:** Scanning probe microscopy - scanning tunneling microscopy-a to micforce microscopy-scanning electron microscopy - transmission electron microscopy -powder XRD method: determination of structure and grain size analysis-UV-visible and photo lumine scence spectroscopy.
UNIT-V	**APPLICATIONS OF NANOMATERIALS:** Medicine: drug delivery - photodynamic therapy – molecular motors -energy: fuel cells – rechargeable batteries - super capacitors- photo voltaics. sensors: nano sensors based on optical and physical properties–electro chemical sensors- nano biosensors.Nano electronics: CNTFET -display screens- GMR read / write heads- nano robots-applications of CNTs
TEXTBOOKS	1. K.K.Chattopadhyay and A.N.Banerjee, (2012),Introduction to Nanoscience and Nanotechnology,PHI Learning Pvt. Ltd., 2. M.A.Shah,Tokeer Ahmad (2010), Principles of Nano science and Nano technology,Narosa Publishing House Pvt Ltd. 3. Mick Wilson, etal (2005) Nano technology, Overseas Press.
REFERENCE BOOKS	1. Richard Booker and Earl Boysen, (2005) Nanotechnology, WileyPublishingInc.USA 2. J.H.Fendler(2007)Nanoparticlesandnanostructuredfilms;Preparation, Characterization andApplications, John Wiley andSons 3. B.S.Murty,etal(2012)TextbookofNanoscienceandNanotechnology, UniversitiesPress.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

SEC-8

COMMUNICATION PHYSICS	
Learning Objective: To get at horough knowledge on transmission and reception of radio waves,the different types of communication like fibreoptic,radar,satellite,cellular.	
UNITS	**COURSEDETAILS**

UNIT-I	**RADIO TRANSMISSION AND RECEPTION:** Transmitter – modulation types of modulation – amplitude modulation – limitations of amplitude modulation – frequency modulation – comparison of FMand AM – demodulation- essentials in demodulation – receivers: AM radio receivers.- types of AM radio receivers – superheterodyne radio receiver,advantages-FMreceiver-differencebetweenFM andAMreceivers.
UNIT-II	**FIBER OPTIC COMMUNICATION:** Introduction – Basic principle of fiber optics– advantages– construction of optical fiber– classification based on there fractive index profile – classification based on the number of modes of propagation – losses in optical fibers-attenuation-advantages of fiber optic communication.
UNIT-III	**RADAR COMMUNICATION: I**ntroduction - basic radar system – radar range – antenna scanning –pulsed radar system – search radar-tracking radar –moving target indicator Doppler effect-MTI principle- CW Doppler radar.
UNIT-IV	**SATELLITE COMMUNICATION:** Introduction history of satellites – satellite communication system – satellite orbits – basic components of satellite communication system- commonly used frequency in satellite – communication –multiple access communication – satellite communication in India.
UNIT-V	**MOBILE COMMUNICATION:**Introduction- concept of cell-basic cellular mobile radio system – cell phone – facsimile – important features of fax machine – application of facsimile – VSAT (very small a pertureterminals)modemIPTV(internetprotocoltelevision)-Wi-Fi-4G (basicideas).
TEXTBOOKS	1. V.K.Metha,Principles of Electronics,S.ChandandCoLtd.,2013. 2. Anokh Singh and Chopra A.K.Principles of communication Engineering, S.Chand and Co, 2013.
REFERENCE BOOKS	1. J.S. Chitode, Digital Communications, 2020, Unicorn publications. 2. Senior John. M,Optical Fiber Communications: Principles and Practice, 2009, Pearson Education.

METHODOFEVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

COREPRACTIAL–III

COURSE	**EVEN SEMESTER CORE**
COURSE TITLE	**CORE GENERAL PRACTICAL-III**
CREDITS	**3**
COURSEOBJECTIVES	Apply various Physics concepts to understand concepts of Light, electricity,Galvanometer and bridge circuits setup experimentation to verify theories,quantify and analyse,able to do error analysis and correlate results.

Minimum of Fourteen Experimentsfromthelist:

1. LCR	:Series Resonance circuit-LandQ
2. LCR	: Parallel Resonance circuit- LandQ
3. Spot Galvanometer	:Determination of mutualinductance
4. Spot Galvanometer	: Comparison of mutualinductance
5. Spot Galvanometer	: High Resistance by leakage
6. Spot Galvanometer	:Internal Resistance of a cell
7. Anderson's Bridge	:Self Inductance
8. Rayleigh's Bridge	:Self Inductance
9. Maxwell's Bridge	:Self Inductance
10. Small angledprism	:Refractive Index
11. Spectro meter	:i-dcurve
12. Spectro meter	:i-i' curve
13. Grating	:Minimum deviation
14. Spectro meter	:Cauchy's constant
15. Spectro meter	:Hartmann's Inter polation Formula
16. Spectro meter	:Small angledprism-refractiveindex
17. Impedance and powerfactor	:L R circuit
18. Impedance and powerfactor	:C R circuit

METHODOFEVALUATION:

ContinuousInternalAssessment	EndSemesterExamination	Total
25	**75**	**100**

COREPRACTIAL–IV

COURSE	**EVENSEMESTERCORE**
COURSETITLE	**COREANALOGELECTRONICSPRACTICAL - IV**
CREDITS	**3**
COURSEOBJECTIVES	ApplyvariousPhysicsconceptstounderstandconceptsofElectronicsandLogicgatessetupexperimentationtoverifytheories,quantifyand analyse,abletodoerroranalysis andcorrelateresults.

Minimum of Fourteen Experiments from the list:

Transist or characteristics: Common Emitter
2. Zenerdiode characteristics
3. Zenervoltager egulator
4. Single Stage Amplifier :gain and band width
5. Clipper and Clamper: discrete components only
6. FET characteristics
7. Hartley Oscillator: Frequency and Inductanceofcoil
8. Colpitt's Oscillator: Frequency and Inductanceofcoil
9. Phase Shift Oscillator: Frequency
10. Wien'sBridgeOscillator:
Frequency 11.Astable Multi
vibrator:using discrete components

12.Monostable Multivibrator: using discrete components
13.Integrator and Differentiator : using discrete components
14.VoltageDoublerandVoltageTripler
15.Logic gates : using discrete components
16.Fullwaverectifier:π filters
17.UJT characteristics
18.SCR characteristics

METHODOFEVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

CORE PRACTIAL – V

COURSE	**EVEN SEMESTER CORE**
COURSE TITLE	**CORE DIGITAL ELECTRONICS PRACTICAL -V**
CREDITS	**3**
COURSE OBJECTIVES	Apply various Physics concepts to understand concepts of Electronics and Logic gates setup experimentation to verify the ories,quantify and analyse, able to do error analysis and correlate results.

1. Logic Gates:IC
2. NAND as Universalgate :IC
3. NORasUniversalgate:IC
4. DualPowerSupply- IC7812andIC 7912
5. De-Morgan'sLaws-Verification
6. Half Adder and Full Adder
7. Four bit binary adder
8. Half Subtractor and Full Subtractor
9. Four bit binary subtractor
10. Astable Multi vibrator -IC 555
11. .SchmittTrigger-IC555
12. BCDcounter
13. AstableMultivibrator-IC741
14. Integrator and Differentiator-IC741
15. Adder andsubtractor -IC 741
16. Four bit binary counter
18. Ring Counter
19. Voltage Regulator –IC 7805

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

COURSE	**ALLIED PAPER**
COURSE TITLE	**ALLIED PHYSICS–I**
CREDITS	**3**
COURSE OBJECTIVES	To impart basic principles of Physics that which would be helpful for students who have taken programmes other than Physics.
UNITS	**COURSE DETAILS**
UNIT-I	**WAVES,OSCILLATIONS AND ULTRASONICS:**simple harmonic motion (SHM) – composition of two SHMs at right angles (periods in the ratio 1:1) – Lissajous figures – uses – laws of transverse vibrations of strings – determination of AC frequency using sonometer (steel and brass wires)–ultrasound –production– piezo electric method–application of ultra sonics: medical field.
UNIT-II	**PROPERTIESOFMATTER:***Elasticity*:elasticconstants–bendingofbeam – theory of non- uniform bending – determination of Young's modulusbynon-uniformbending–energystored in as tretched wire– torsion of a wire – determination of rigidity modulus by torsion alpendulum *Viscosity*:streamlineandturbulentmotion–criticalvelocity–coefficientof viscosity - Poiseuille's formula - comparison of viscosities - burettemethod,*Surfacetension*:definition–moleculartheory–dropletsformation–shape,sizeandlifetime.
UNIT-III	**HEAT AND THERMODYNAMICS:** Joule-Kelvin effect - Joule-Thomsonporousplugexperiment–theory–temperatureofinversion – liquefaction of Oxygen– Linde's process of liquefaction of air–thermodynamic system – thermodynamic equilibrium – laws ofthermodynamics–heatengine–Carnot'scycle–efficiency–entropy – changeofentropyinreversibleandirreversibleprocess.
UNIT-IV	**ELECTRICITY ANDMAGNETISM:**potentiometer–principle–measurement of thermo emf using potentiometer –magnetic field duetoacurrentcarryingconductor–Biot-Savart'slaw–fieldalongtheaxisof the coil carrying current – peak, average and RMS values of accurrentandvoltage–powerfactorandcurrentvaluesinanACcircuit–typesofswitchesinhouseholdandfactories–fusesandcircuitbreakersinhouses.
UNIT-V	**DIGITALELECTRONICSANDDIGITALINDIA:**logicgates,OR,AND,NOT,NAND,NOR,EXORlogicgates–universalbuildingblocks–Booleanalgebra–DeMorgan'stheorem–verification.
UNIT-VI	**PROFESSIONAL COMPONENTS:**expertlectures–seminars – webinars–industryinputs–socialaccountability–patriotism

TEXTBOOKS	1. R.Murugesan(2001),AlliedPhysics,S.ChandandCo,NewDelhi. 2. BrijlalandN.Subramanyam,(1994),WavesandOscillations,VikasPublishingHouse,NewDelhi. 3. Brijlal and N.Subramaniam (1994), Properties of Matter, S.ChandandCo.,New Delhi. 4. J.B.RajamandC.L.Arora(1976).HeatandThermodynamics(8th edition),S.ChandandCo.,NewDelhi. 5. R.Murugesan(2005),OpticsandSpectroscopy,S.ChandandCo,NewDelhi. 6. A.Subramaniyam,AppliedElectronics2ndEdn.,NationalPublishingCo.,Chennai.
REFERENCEBOOKS	1. ResnickHallidayandWalker(2018).FundamentalsofPhysics(11thedition),JohnWilleyandSons,AsiaPvt.Ltd.,Singapore. 2. V.R.KhannaandR.S.Bedi(1998),TextbookofSound1stEdn.KedharnaathPublishandCo, Meerut. 3. N.S.KhareandS.S.Srivastava(1983),ElectricityandMagnetism10thEdn.,AtmaRamand Sons,NewDelhi. 4. D.R.KhannaandH.R.Gulati(1979).Optics,S.ChandandCo.Ltd.,NewDelhi. 5. V.K.Metha(2004).Principlesofelectronics6thEdn.S.Chandandcompany.
WEBRESOURCES	1. https://youtu.be/M_5KYncYNyc 2. https://youtu.be/ljJLJgIvaHY 3. https://youtu.be/7mGqd9HQ_AU 4. https://youtu.be/h5jOAw57OXM 5. https://learningtechnologyofficial.com/category/fluid-mechanics-lab/ 6. http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.htmlhttps://www.youtube.com/watch?v=gT8Nth9NWPMhttps://www.youtube.com/watch?v=9mXOMzUruMQandt=1shttps://www.youtube.com/watch?v=m4u-SuaSu1sandt=3shttps://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work

METHODOFEVALUATION:

ContinuousInternalAssessment	EndSemesterExamination	Total
25	**75**	**100**

COURSE	**ALLIEDPAPER**
COURSETITLE	**ALLIEDPHYSICS –II**
CREDITS	3
COURSEOBJECTIVES	Tounderstandthebasicconceptsofoptics,modernPhysics,conceptsofrelativityandquantumphysics,semiconductorphysics, and electronics.
UNITS	**COURSEDETAILS**

UNIT-I	**OPTICS:**Interference –interferenceinthinfilms –colorsofthinfilms – airwedge–determinationofdiameterofathinwirebyairwedge – diffraction –normal incidence – experimental determination ofwavelength using diffraction grating (no theory) – polarization – polarization by double reflection – Brewster's law – optical activity – applicationinsugarindustries
UNIT-II	**ATOMIC PHYSICS:** Atom models – Bohr atom model–massnumber–atomicnumber–nucleons–vectoratommodel–Pauli'sexclusion principle –periodic classification of elements – Bohrmagnetron–Starkeffect–Zeemaneffect(elementaryideasonly)–photoelectriceffect– Einstein'sphotoelectricequation–applicationsofphotoelectriceffect:solarcells.
UNIT-III	**NUCLEARPHYSICS:**Nuclearmodels–liquiddropmodel–magic numbers–shellmodel–nuclearenergy–massdefect–bindingenergy – radioactivity – uses – half life – mean life – radio isotopesanduses–nuclearfission–energyreleasedinfission–atombomb–nuclearreactor–nuclearfusion–thermonuclearreactions–differencesbetweenfission andfusion.
UNIT-IV	**INTRODUCTIONTO RELATIVITY AND GRAVITATIONAL WAVES**: Frame of reference – postulates of special theory ofrelativity–Galileantransformationequations–Lorentztransformation equations – derivation – length contraction – timedilation–twinparadox–mass–energyequivalence.
UNIT-V	**SEMICONDUCTOR PHYSICS:** p-n junction diode – forward and reverse biasing– characteristicofdiode– zenerdiode–characteristic of zenerdiode–voltageregulator–fullwavebridgerectifier – construction and working – advantages (no mathematicaltreatment)–Transistor–PNP–NPN–working–CEamplifier–frequency responsecurve.
UNIT-VI	**PROFESSIONAL COMPONENTS:**Expertlectures–seminars – webinars–industryinputs–socialaccountability–patriotism
TEXTBOOKS	1. R.Murugesan (2005), Allied Physics, S.Chand and Co,NewDelhi. 2. K.ThangarajandD.Jayaraman(2004),AlliedPhysics,PopularBookDepot,Chennai. 3. BrijlalandN.Subramanyam(2002),TextbookofOptics,S.ChandandCo,NewDelhi. 4. R.Murugesan(2005),ModernPhysics,S.ChandandCo,NewDelhi. 5. A.Subramaniyam Applied Electronics, 2nd Edn., NationalPublishingCo.,Chennai.

REFERENCEBOOKS	1. Resnick Halliday and Walker (2018), Fundamentals of Physics,11th Edn.,John Willey and Sons, Asia Pvt. Ltd., Singapore. 2. D.R.Khanna and H.R.Gulati (1979).Optics,S.Chand and Co. Ltd.,NewDelhi. 3. A.Beiser (1997), Concepts of Modern Physics,Tata Mc Graw Hill Publication,NewDelhi. 4. Thomas L.Floyd (2017), Digital Fundamentals, 11th Edn., Universal Book Stall, NewDelhi. 5. V.K.Metha(2004),Principles of electronics, 6thEdn.,S.Chand and Company, NewDelhi.
WEBRESOURCES	1. https://www.berkshire.com/learning-center/delta-p-facemask/https://www.youtube.com/watch?v=QrhxU47gtj4https://www.youtube.com/watch?time_continue=318andv=D38BjgUdL5Uandfeature=emb_logo 2. https://www.youtube.com/watch?v=JrRrp5F-Qu4 3. https://www.validyne.com/blog/leak-test-using-pressure-transducers/ 4. https://www.atoptics.co.uk/atoptics/blsky.htm- 5. https://www.metoffice.gov.uk/weather/learn-about/weather/optical-effects

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

COURSE	**EVEN SEMESTER- CORE**
COURSETITLE	**ALLIED PRACTICAL– I**
CREDITS	**3**
COURSEOBJECTIVES	Apply various Physics concepts to understand concepts of Properties of matter, Mechanics Light,electricity and Electronics setup experimentation to verify the ories, quantify and analyse,able to doerror analysis and correlate results.

Miinimum of Fourteen Experiments from the list:

1. Young's modulus by non-uniform bending using pin and microscope
2. Young's modulus by non-uniform bending using opticlever, scale and telescope
3. Rigidity modulus by statictorsion method.
4. Rigidity modulus by torsionaloscillations with out mass
5. Calibration of low range voltmeterusingpotentiometer
6. Verification of truth tables of basic logicgates using ICs
7. Verification of De Morgan's the or emsusing logicgate ICs.
8. Use of NAND as universal building block.
9. Radius of curvature of lens by formingNewton's rings
10. Thickness of a wire using air wedge
11. Refractive index of material of the lens by minimum deviation
12. Determinationof ACfrequencyusingsonometer
13. ThermalconductivityofpoorconductorusingLee's disc
14. CharacterisationofZenerdiode
15. Constructionof AND, OR, NOT gates using diodes and transistor
16. Use of NOR gate as a universal building block
17. wave lengths of Spectrallines using spectro meter and Grating
18. Bridge Rectifier.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

ANCILLARY-APPLIED ELECTRONICS AND INTEGRATED CIRCUITS

BASIC ELECTRONICS AND INSTRUMENTATION	
LearningObjective:-Tounderstandthebasicsemiconductorphysics. -To studytheoperationofvariousdiodes,transistors. -To gainknowledgeaboutoptoelectronicdevicesand transducers. -To understandtheworkingof DCandACmeasuring instruments.	
UNITS	**COURSEDETAILS**
UNIT-I	**Semiconductors:**Semiconductor-bandsinsemiconductors-crystalstructure-Intrinsic semiconductor-Extrinsic semiconductor-pn junction-pnjunctioncharacteristics-halfwave,fullwaveandbridgerectifierswithRC&LC filters-zenerdiodecharacteristics-Tunneldiode-Varactordiode-Shockleydiode.(Mehta&RohitMehtaChap6,7-relevantareas).
UNIT-II	**Transistors :**Transistor-transistor action-transistor biasing- npn, pnptransistor-transistor characteristics-common base and common emittercharacteristics-FET and MOSFET Depletion Mode and Enhancementmode-characteristics.(Mehta&RohitMehtaChap8,19-relevant areas).
UNIT-III	**Optoelectronic devices:** LDR or Photoconductive cell- Photodiode-Photovoltaic or solar cells-LED (light emitting diode)-Types of lasers-laseraction-PopulationInversion-spontaneousandstimulated emission-pnjunctionlaser.(Gupta&KumarChap3-relevantareas).

UNIT-IV	**Transducers:**ClassificationofTransducers-Characteristicsoftransducers-Activeandpassivetransducers-requirementsofatransducer-piezoelectrictransducer-photoelectrictransducer-thermistor-capacitivetransducer-inductivetransducer-potentiometric transducer.(Salivahanan&SureshkumarChap3-relevantareas).
UNIT-V	**DCandACmeasuringinstruments:**Galvanometer-ammeter-dcvoltmeter-digitalmultimeter-energymeter-powermeter-wattmeter-Vacuumtubevoltmeter-applicationofVTVM-meritsanddemeritsof VTVM. (Salivahanan&SureshkumarChap23-relevantareas).
TEXTBOOKS	1. V.K.Mehta,RohitMehta-PrinciplesofElectronics. 2. DrS.L.GuptaandDrV.Kumar-HandbookofElectronics. 3. S.SalivahananandN.Sureshkumar-Electronicdevicesandcircuits.
REFERENCE BOOKS	1. A.K.Sawhney-Acourseinelectricalandelectronicmeasurementsandinstrumentation. 2. B.L.Theraja-Basicelectronics. 3. J.J.Brophy-Basicelectronicsforscientists.

METHODOFEVALUATION:

ContinuousInternalAssessment	EndSemesterExamination	Total
25	**75**	**100**

INTEGRATEDCIRCUITSANDAPPLICATIONS	
LearningObjective:-Tounderstandthefabricationofintegratedcircuits. -Togainknowledgeaboutlogicgates. -Tostudydataprocessingcircuits. -TounderstandtheworkingofOPAMP.	
UNITS	**COURSEDETAILS**
UNIT-I	**IntegratedCircuitFabrication:**ClassificationofICs-monolithiccircuits-epitaxial growth-oxidation-photolithography-metallization-monolithicbipolartransistor-monolithicdiodes-integratedresistors-monolithiccapacitorsandinductors.(Salivahanan&SureshkumarChap19-relevant areas).
UNIT-II	**Number system and logic gates:** Number system-binary, decimal-binaryaddition-binarysubtraction-basiclawsofBooleanalgebra-positive logic-logic gates-OR, AND, NOT, NOR, NAND and EX-ORgatesusingdiscretecomponents.(Malvino&LeachChap2,3,5-relevant areas).
UNIT-III	**Optoelectronic devices:** LDR or Photoconductive cell- Photodiode-Photovoltaicorsolarcells-LED(lightemittingdiode)-lasers-laseraction-spontaneousandstimulatedemission-pnjunctionlaser.(Gupta&KumarChap3-relevant areas).
UNIT-IV	**Timers, Flip flops and Counters:** Timer-IC555-astablemultivibrator -monostablemultivibrator-Flipflops-RSflipflop(usingNANDandNOR),Dflipflop-JKflipflop-JKmasterslaveflipflop-counters-decadecounter-digitalclock.(Malvino&LeachChap7,8,10-relevantareas).

UNIT-V	**OperationalAmplifier:**Operationalamplifier-differentialamplifier-basic circuit of differential amplifier-operation of differential amplifier-commonmodeanddifferentialmodesignals-voltagegain-commonmoderejectionratio(CMRR)-slewrate-applications-adder,comparator.(Mehta&RohitMehta Chap25-relevant areas).
TEXTBOOKS	1. S.SalivahananandN.Sureshkumar-Electronicdevicesandcircuits. 2. DonaldPLeach,AlbertPaulMalvino,GautamSaha(8th edition)-DigitalPrinciplesandApplications. 3. V.K.Mehta,RohitMehta-PrinciplesofElectronics.
REFERENCE BOOKS	1. MillmanandHalkias-ElectronicDevicesandCircuits. 2.JaydeepChakravorty-Digital Electronics and Logic Design.3.DrS.L.GuptaandDrV.Kumar-HandbookofElectronics.

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

COURSE	**APPLIED ELECTRONICS PRACTICAL–I**
COURSETITLE	**LINEAR AND DIGITAL IC s LAB**
CREDITS	2
COURSEOBJECTIVES	Apply various Physics concepts to understand concepts of Electronics and Logic Gates setup experimentation to verify the ories, quantify and analyse,able to do error analysis and correlate results.

Minimum of Fourteen Experiments from the list:

1. Measurement of R,C and L
2. Diode wave shaping circuits
3. Bridge rectifier-output characteristics and percentage of regulation
4. IC7805 voltage regulator
5. FET characteristics
6. Logicgates-OR,AND,NOT,NOR,NAND (usingICsonly)
7. Halfadder (using NOR and NAND gatesonly)
8. Half subtractor(using NOR and NAND gatesonly)
9. Opamposcillator
10. Opamp-low passfilter
11. LED and seven segment display
12. BCD to decimal decoder
13. Opamp-D/Aconversion
14. IC555timercharacteristics
15. Monostablemultivibrator-IC555
16. Bistablemultivibrator-IC555
17. Astablemultivibrator-IC741
18. Solar cell characteristics

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**