



SAURASHTRA UNIVERSITY

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वसुधैव कुटुम्बकम्

ONE EARTH • ONE FAMILY • ONE FUTURE

નં.એકે/વિજ્ઞાન/ ૮૫૧૧૬ /૨૦૨૩

તા. ૩૧/૦૮/૨૦૨૩

ભૌતિકશાસ્ત્ર

પરિપત્ર:-

સૌરાષ્ટ્ર યુનિવર્સિટીની વિજ્ઞાન વિદ્યાશાખા હેઠળની સ્નાતક કક્ષાના B.Sc.(ભૌતિકશાસ્ત્ર)ના અભ્યાસક્રમ ચલાવતી સર્વે સંલગ્ન કોલેજોના આચાર્યશ્રીઓને આથી જાણ કરવામાં આવે છે કે, NEP-2020 અંતર્ગતના રાજ્ય સરકારશ્રીના તા.૧૧/૦૭/૨૦૨૩ના ઠરાવ ત્યારબાદ તા.૨૭/૦૭/૨૦૨૩ના રોજ પ્રકાશિત થયેલ સ્ટાન્ડર્ડ ઓપરેટિંગ પ્રોસિજર(SOP) તેમજ ત્યારબાદ તેને આનુસંગિક તા.૨૮/૦૭/૨૦૨૩ના રોજ આવેલ સુધારા મુજબના અભ્યાસક્રમો વિષય નિષ્ણાંતશ્રી, ભૌતિકશાસ્ત્ર વિષયની અભ્યાસ સમિતિ દ્વારા રજુ કરાયેલ B.Sc.(ભૌતિકશાસ્ત્ર) સેમેસ્ટર-૦૧ના અભ્યાસક્રમો આગામી શૈક્ષણિક સત્ર જુન-૨૦૨૩થી અમલમાં આવે તે રીતે ભૌતિકશાસ્ત્ર વિષયની અભ્યાસ સમિતિ, વિજ્ઞાન વિદ્યાશાખા, એકેડેમિક કાઉન્સિલ તથા સિન્ડિકેટની બહાલીની અપેક્ષાએ મંજૂર કરવા માન.કુલપતિશ્રીને ભલામણ કરેલ, જે માન.કુલપતિશ્રીએ મંજૂર કરેલ છે. જેથી સંબંધિત તમામે તે મુજબ તેની ચુસ્તપણે અમલવારી કરવી.

(મુસદ્દો કુલસચિવશ્રીએ મંજૂર કરેલ છે.)

સહી/-

(ડૉ. એચ.પી.રૂપારેલીઆ)

કુલસચિવ

બિડાણ:- ઉક્ત અભ્યાસક્રમ (સોફ્ટ કોપી)

રવાના કર્યું

પ્રતિ,

(૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની ભૌતિકશાસ્ત્ર વિષય ચલાવતી સ્નાતક કક્ષાની સર્વે સંલગ્ન કોલેજોના આચાર્યશ્રીઓ

(૨) વિજ્ઞાન વિદ્યાશાખા હેઠળની ભૌતિકશાસ્ત્ર વિષયની અભ્યાસ સમિતિના સર્વે સભ્યશ્રીઓ

નકલ જાણ અર્થે રવાના:-

૧. માન.કુલપતિશ્રી/કુલસચિવશ્રીના અંગત સચિવ

નકલ રવાના (જરૂરી કાર્યવાહી અર્થે):-

૧. ડીનશ્રી, વિજ્ઞાન વિદ્યાશાખા

૨. પરીક્ષા વિભાગ

૩. પી.જી.ટી.આર.વિભાગ

૪. જોડાણ વિભાગ



SAURASHTRA UNIVERSITY



FACULTY OF SCIENCE

Course Structure and Syllabus for Science FYUGP

B.Sc. Honours/ Honours with Research in Physics

Based on

UGC's guidelines NEP-2020 "Curriculum and Credit Framework for Undergraduate Programmes- CCFUP" and

Education Department, Government of Gujarat's
Uniform Credit Structure for all HEIs of Gujarat State and
Implementation of the Common Curriculum and Credit Framework under the National
Education Policy-2020

(No: KCG/admin/2023-24/0607/kh.1 Sachivalaya, Gandhinagar dated 11/07/2023) and

Standard Operating Procedure for Implementation of NEP-2020 for the State of Gujarat- HEIs
of Gujarat

(No: KCG/admin/2023-24/865/ dated 26/07/2023) and

Additional content to be added to SOP published by KCG

(No: KCG/NEP-2020/2023-24/893/ dated 28/07/2023)

Effective From June – 2023 & onwards



Curriculum Design/Syllabus Preparation Committee

Sr. No.	Name & Designation	
1.	Prof. N.A.Shah Prof & Head Physics Department, Saurashtra University Rajkot.	Member
2.	Mr. Umang J Vyas Associate Prof. & Head Physics Department, H & H B Kotak Institute of Science Rajkot	Member
3.	Dr. R.K.Trivedi Associate Prof. Physics Department, H & H B Kotak Institute of Science Rajkot	Member
4.	Dr. K.H.Jani Associate Prof. Physics Department, D.K.V. Arts & Science College Jamnagar	Member
5.	Dr. Amit Raval Associate Prof. & Head Physics Department, D.K.V. Arts & Science College Jamnagar	Member
6.	Dr. H O Jethava Associate Prof. Physics Department, Saurashtra University Rajkot	Member
7.	Dr. P. Arvindxasan Associate Prof. & Head Physics Department Crise College Rajkot	Member
8.	Dr. Purvesh Vyas Asst Prof. Physics Department Kamani Science College Amreli	Member



Graduate Attributes:

Some of the characteristic attributes a graduate in Physics should possess are:

- Disciplinary knowledge and skills:
- Skilled communication:
- Critical thinking and problem-solving capacity:
- Sense of inquiry:
- Team player/worker:
- Project Management Skills:
- Digital and ICT efficiency:
- Ethical awareness / reasoning:
- National and international perspective:
- Lifelong learning

Graduates should be able to demonstrate the acquisition of the following:

Academic excellence: Comprehensive knowledge and coherent understanding of Physics and other interdisciplinary areas of study.

Practical, professional, and procedural knowledge required for carrying out professional or highly skilled work/tasks related to Physics, including knowledge required for undertaking self-employment initiatives and knowledge and mind-set required for entrepreneurship, improved product development, or a new mode of organization.

Critical and Analytical reasoning/thinking and Effective communications: Analysis and evaluation of information to form a judgment about a subject or idea and ability to communicate the same in a structured form.

Research-related skills: The ability to understand basic research ethics and skills in practicing/doing ethics in the field/ in personal research work, regardless of the funding authority or field of study.

Leadership qualities and Teamwork abilities: The graduates should be able to demonstrate the capability for mapping out the tasks of a team and setting direction and inspiring vision, and building a team that can help achieve the goals.

Global Citizenship: Mutual understanding with others from diverse cultures, perspectives, and backgrounds by embracing and practicing constitutional, humanistic, ethical, and moral values in life, including universal human values of truth, righteous conduct, peace, love, nonviolence, and scientific temper.

Life Long Learning: Ready to imbibe new knowledge, values, and skills with an open mind and willing to adopt change for constructive development.

Programme Outcomes (PO):

By the end of the program the students will be able to:

PO 1	Create the facilities and environment in all the educational institutions to consolidate the knowledge acquired at +2 level and to motivate and inspire the students to create deep interest in Physics, to develop broad and balanced knowledge and understanding of physical concepts, principles and theories of Physics.
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PO 2	Learn, design and perform experiments in the labs to demonstrate the concepts, principles and theories learned in the classrooms.
PO 3	Develop the ability to apply the knowledge acquired in the classroom and laboratories to specific problems in theoretical and experimental Physics.
PO 4	Expose the student to the vast scope of Physics as a theoretical and experimental science with applications in solving most of the problems in nature spanning from 10^{-15} m to 10^{26} m in space and 10^{-10} eV to 10^{25} eV in energy dimensions.
PO 5	Emphasize the discipline of Physics to be the most important branch of science for pursuing the interdisciplinary and multidisciplinary higher education and/or research in interdisciplinary and multidisciplinary areas.
PO 6	To emphasize the importance of Physics as the most important discipline for sustaining the existing industries and establishing new ones to create job opportunities at all levels of employment.

Programme Specific Outcomes (PSO):

By the end of the program the students will be able to:

PSO 1	At the end of first year – Ability to solve well defined problems
PSO 2	At the end of second year – Ability to solve broadly defined problems
PSO 3	At the end of third year – Ability to solve complex problems that are ill- structure that require multi-disciplinary skills to solve them
PSO 4	During fourth year – Experience of workplace problem solving in the form of internship or Research Experience preparing for higher education or Entrepreneurship and employment.



B.Sc. Honours/ Honours with Research in Mathematics

(NCrF Level- 4.5 First Year – Certificate in Mathematics)

Semester I

SN	Course Category As per GoG- NEP- SOP - July 2023 & additional content 28/7/23	Course Title	Credit		SEE Dura tion Hrs.	Evaluation - Weightage CCE: SEE = 50:50		
			T	P		CCE Marks	SEE Marks	Total Marks
1	Major (Core) 1 (Physics)	Physics 1: Concept of Physics -1	3	-	2 $\frac{1}{2}$	75	75	150 To be converted for 75
2	Major(Core) 1 Practical (Physics)	Physics-1P: Experimental Analysis in Physics-1	-	1	2	25	25	50 To be converted for 25
3	Major (Core) 2 (Physics)	Physics 2: Concept of Physics -2	3	-	2 $\frac{1}{2}$	75	75	150 To be converted for 75
4	Major (Core) 2 Practical (Physics)	Physics-2P: Experimental Analysis in Physics-2	-	1	2	25	25	50 To be converted for 25
5	Minor(Elective)*-1	(As per GoG- NEP-SOP July 2023 & additional content 28/7/23 – Clause 3.3.2) Any One from Basket (As per the expertise and resources available in the college)	3	-	2 $\frac{1}{2}$	75	75	150 To be converted for 75
6	Minor (Elective) Practical*-1	Practical of the Course selected as Minor	-	1	2	25	25	50 To be converted for 25
7	Multi/Inter - Disciplinary Course -1 (MDC/IDC-1) (Elective)**	(As per GoG- NEP-SOP July 2023 & additional content 28/7/23 – Clause 3.3.3) Any One from Basket (As per the expertise and resources available in the college)	3		2 $\frac{1}{2}$	75	75	150 To be converted for 75
8	Multi/Inter - Disciplinary Course Practical-1** (MDC/IDC-1) (Elective)	Practical of the Course selected as MDC/IDC-1	-	1	2	25	25	50 To be converted for 25
9	Ability Enhancement Course -1 (AEC-1)	(As per GoG- NEP-SOP July 2023 & additional content 28/7/23 – Clause 3.3.4) English Language:	2	-	2	50	50	100 To be converted for 50



		Development of Functional English						
10	Skill Enhancement Course-1 (SEC-1)	(As per GoG- NEP-SOP July 2023 & additional content 28/7/23 – Clause 3.3.5) Skill based Practical Course-1: SKILL ENHANCEMENT IN BASIC ELECTRICAL APPLIANCES	-	2	2	50	50	100 To be converted for 50
11	Common Value Added Course-1 (C-VAC-1)*** NSS/NCC/ Sports & Fitness/ Ethics and Culture/ Culture and Communication/ Ethics and Values in Ancient Indian Traditions/ Human Values and Ethics/IPDC	(As per GoG- NEP-SOP July 2023 & additional content 28/7/23 – Clause 3.3.6) VAC based on IKS: NSS/NCC/Sports & Fitness/Human Values and Ethics	-	2	2	50	50	100 To be converted for 50
Total Credits and Marks (Semester-I)			14	8	NA	550	550	1100 To be converted for 550

* Any one course from the basket is to be selected as a Minor elective course as per the expertise and resources available in the college. The same course will continue as a Minor in the semester-II as well.

** Any one course from the basket is to be selected as Multi/Inter disciplinary elective courses (MDC/IDC) as per the expertise and resources available in the college. The same MDC/IDC course will continue in the semester-II as well.

*** **Common Value Added Elective Courses (C-VAC-1)** common to all is to be selected from University Basket for semester 1, as per the expertise and resources available in the college.



Courses Offered by BoS of Physics to other FYUGP- B.Sc. Program in Semester-I								
SN	Course Category As per GoG- NEP- SOP - July 2023& additional content 28/7/23	Course Title	Credit		SEE Durati on Hrs.	Evaluation - Weightage CCE: SEE = 50:50		
			T	P		CCE Marks	SEE Marks	Total Marks
1	Minor (Elective)-1 (Physics) (In addition to courses mentioned in SOP basket; Recommended for Chemistry/ Maths/Industrial Chemistry/ Statistics/Computer Science/Zoology/Botany/ Biochemistry/ Biotechnology/ Microbiology/etc...)	Physics -1: Concept of Physics-1	3	-	2½	75	75	150 To be converted for 75
2	Minor (Elective) Practical-1 (Physics) (In addition to courses mentioned in SOP basket; Recommended for Chemistry/ Maths/Industrial Chemistry/ Statistics/Computer Science/Zoology/Botany/ Biochemistry/ Biotechnology/ Microbiology/etc...)	Physics-1P: Experimental Analysis in Physics-1	-	1	2	25	25	50 To be converted for 25
3	Multi/Inter - Disciplinary Course -1 (MDC/IDC-1) (Elective) (In addition to courses mentioned in SOP basket; Recommended for Chemistry/ Maths/Industrial Chemistry/ Statistics/Computer Science/Zoology/Botany/ Biochemistry/ Biotechnology/ Microbiology/etc...)	Physics: Introduction to Physics -1	3	-	2½	75	75	150 To be converted for 75
4	Multi/Inter - Disciplinary Course Practical-1 (MDC/IDC Practical-1) (Elective) (In addition	Physics: Experimental Study of Basic Physics-1	-	1	2	25	25	50 To be converted for 25



to courses mentioned in SOP basket; Recommended for Chemistry/ Maths/ Industrial Chemistry/ Statistics/Computer Science/Zoology/Botany/ Biochemistry/ Biotechnology/ Microbiology/etc...)							
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Evaluation Scheme: (As per GoG- NEP-SOP July 2023 & additional content 28/7/23 – Chapter-7: Evaluation Reforms)

The evaluation process should be formulated to make a systematic evaluation of students’ progress based on UGC guidelines. The evaluation must be designed with learner attributes in mind. These attributes have clear linkages to Programme Education Objectives and Outcomes. The evaluation consists of the following two components:

1. Continuous and Comprehensive Evaluation (CCE)- Formative
2. Semester End Evaluation (SEE)- Summative

CCE carries 50% of the total marks allotted to a subject and the other 50% being assigned to the SEE.

In each course, every credit carries 25 marks, of which 50% marks is assigned for CCE and rest 50% marks for SEE. The 50% marks assigned to the CCE is distributed between the continuous classroom evaluation and mid-term evaluation. The pattern may be as follow:

SN	Evaluation	4 credit subjects (Marks)	2 credit subjects (Marks)
1	CCE (50%)		
	Classroom & Mid-Term Evaluation	50	25
2	SEE (50%)	50	25
	Total	100	50

Continuous and Comprehensive Evaluation (CCE)

Subject–wise CCE will be undertaken by the concerned faculty member. The mode of evaluation will be decided by the faculty member concerned with the subject. Normally CCE consists of class participation, case analysis and presentation, assignment, tutorials, slip tests (announced/ surprised), quizzes, attendance etc. or any combination of these. The students are expected to submit their answer scripts/ reports of internal evaluation within the stipulated time. Failure to do so may result in the script not being valued. Another part of CCE consists of mid-term written evaluation, which is compulsory for all students. It can be done in a scheduled manner. The duration of the mid-term evaluation shall be one hour.

Semester End Evaluation (SEE)

The SEE carries 50% of the marks assigned to a course. SEE shall be of 2 ½ hours for 4 credit course and 2 hours in case of 2 credit courses. The controller of the examination will conduct these examinations. Paper setting and evaluation will be done by the external examiners to an extent of 50%



of the evaluation process. This examination shall be conducted as per a schedule which shall be notified in advance.

The backlog exam will be conducted twice a year just after the result declared of the semester evaluation. Students shall have a second chance to clear their backlog and avoid the burden to carry forward the backlog with the next semester exam.

Appearance in all the evaluations is mandatory and no exemption can be granted except in the following case:

1. In case of inability to attend the exam due to reasons considered genuine by the controller of examination in consultation with the Director/Board.
2. In case of medical emergency, a certificate from the registered medical practitioner must be produced before the commencement of exams. The evaluation board will then take final decision on the recommendation for exemption.

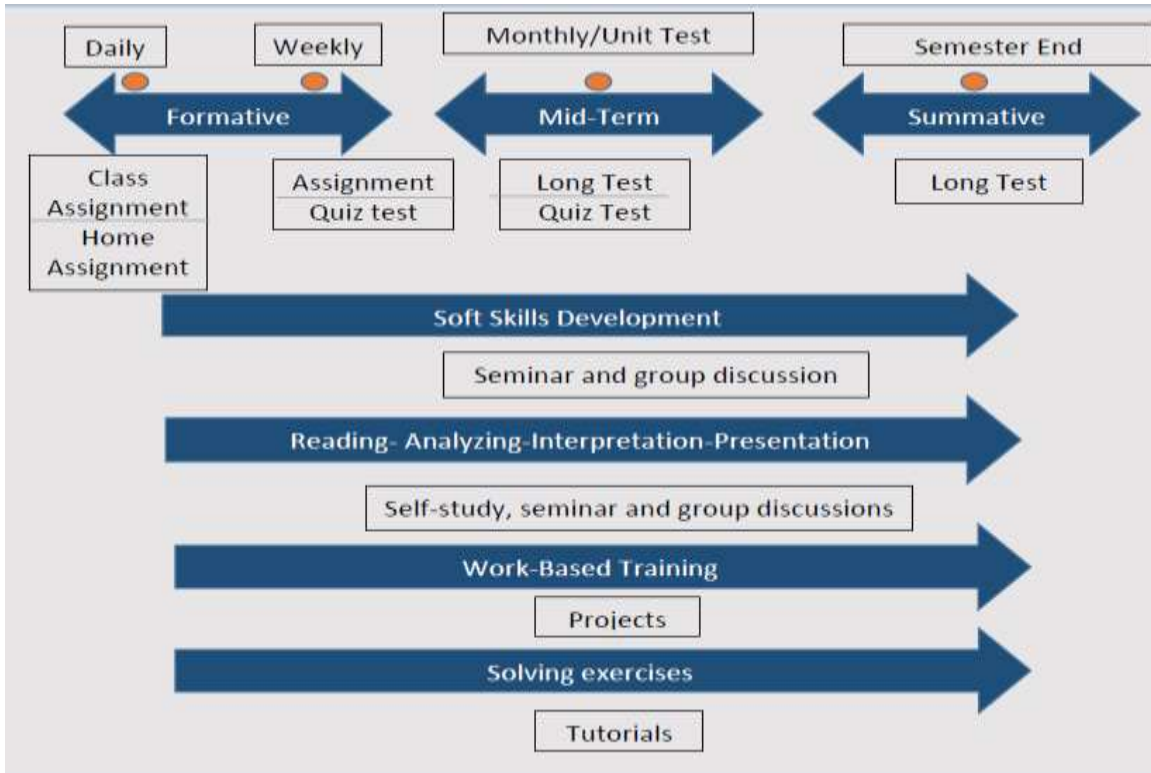
Eligibility Criteria to appear in SEE

To be able to appear for the SEE, a student must comply with the following conditions:

1. Should have at least 75% of attendance in all the courses put together.
2. Should have at least 70% of attendance in each course/subject.
3. Should not have any disciplinary proceedings pending against him/her.
4. Should have no pending due.

Continuum of Evaluation

Evaluation must be continuous which may include both formative and summative components in a timely manner for continuous feedback as follow:



Mode of Evaluation

A wide range of modes of evaluation for evaluating students is available for the teachers/ institutions to use. A suitable compendium of such a mode needs to be carefully chosen for a particular program depending on its nature, objectives, and available resources. The mode of evaluation can be as below:

Written Mode	Oral Mode	Practical Mode	Integrated Mode
Semester Exam Class Test Open book exam/test Open note exam/test Self-test/Online test Essay/Article writing Quizzes/Objective test Class assignment Home assignment Reports writing Research/Dissertation Class Studies	Viva/Oral exam Group Discussion Roal Play Authentic Problem Solving Quiz Interview	Lab work Computer simulation/virtual labs Craft work Co-curricular work	Paper presentation/Seminar Field Assignment Poster Presentation



Written Mode		
Evaluation Type	Nature	Objective
Semester Exam	Traditionally essay type with objective/short answer questions to evaluate Lower Ordered Thinking (LOT) OBE skills	For depth and planned preparation
Class test	Traditionally essay type	Fixed date forces students to learn
Open book test	Allowed choice of reference book	Measures what students can do with resources, less stress on memory
Open note test	To get used to the system	Encourage good note taking
Self-test	For subjective and objective items	Mastery learning occurs with proper feedback
Article/essay writing	Individual long written assignment	Individual expression and creativity
Quizzes/Objective test	Short duration structured test	Excellent validity as greater syllabus coverage
Class assignment	With defined time	Student's performance to make decision
Home assignment	With undefined time	Reinforce learning and facilitate mastery of specific skills
Reports Writing	On activities performed or event observed	Develop a key transferable skill
Research/Dissertation	Detailed research-based report	To judge creativity and research skills
Case Studies	Analyse a given case (real or fictional)	To assess thinking, value, and attitude
Oral Mode		
Evaluation Type	Nature	Objective
Viva/Oral exam	Individually or in small group	Practical experience towards job interview situation
Group discussion	Small group of 2-5 members work on a joint task	Encourage teamwork
Role Play	Small group of 2-5 members work on a joint task	Develop personality
Authenticate problem solving	Small group of 2-5 members work on a joint task	Communication of ideas
Quiz	Small group of 2-5 members work on a joint task	Assess memory power
Interview	Individually	Judge the personal confidence level



Practical Mode		
Evaluation Type	Nature	Objective
Lab work	Component of working with one's hand	Keep the students on the task
Computer simulation/virtual labs	Component of working with one's hand	To understand the practical exposure
Craft work	Component of working with one's hand	Encourage application of concepts learnt
Co-curricular work	Component of working with one's hand	For immediate feedback

Integrated Mode		
Evaluation Type	Nature	Objective
Paper presentation/Seminar	Group or individual work	Learn from others presentation
Field Assignment	Field visit with report	Develop observation and recording skills
Poster presentation	Group or individual work	Develop research, creativity, and discussion skills
Paper presentation/Seminar	Group or individual work	Learn from others presentation

Models of Evaluation

Based on the types of evaluation, various models of evaluation implementation are suggested for theory, practical, self-study and work-based learning. The focus of these models is to encourage the students to improve on skills and performance.



Model for Theory Courses- 3 Credit Course	
CCE-50% (75) & SEE-50% (75)	
Exam Pattern	Marks
Class Test (Average of TWO tests)	15
Quiz (Average of TWO quiz)	15
Home Assignment	15
Active Learning- PBL/CSBL/Seminar/Flipped Class Room etc..OBE tools.	10
Class Assignment	10
Attendance	10
Continuous and Comprehensive Evaluation	75
Semester-End Evaluation	75

*Similarly Model for Theory 4 Credit Courses be formulated and can be implemented after discussion and approval.

Model for Practical Courses- 1 Credit Course	
CCE-50% (25) & SEE-50% (25)	
Exam Pattern	Marks
Lab work assessment	10
Viva voce/Lab quiz	10
Attendance	05
Continuous and Comprehensive Evaluation	25
Semester-End Evaluation	25

*Similarly Model for Practical 2-Credit Courses be formulated and can be implemented after discussion and approval.

Model for Project/Self-study Courses- 4 Credit Course	
CCE-50% (100) & SEE-50% (100)	
Exam Pattern	Marks
Project Evaluation (Best 4 out of 5)	80
Participation in discussion	10
Attendance	10
Continuous and Comprehensive Evaluation	100
Semester-End Evaluation	100

*Model for Project/Self-study Courses will be implemented from semester-6 after discussion and approval.

Model for Work Experience Courses – 4 Credit Course	
CCE-50% (100) & SEE-50% (100)	
Exam Pattern	Marks
Project Evaluation (Best 4 out of 5)	80
Participation in discussion	10
Attendance	10
Continuous and Comprehensive Evaluation	100
Semester-End Evaluation	100

*Model for Work Experience Courses will be implemented from semester-6 after discussion and approval.



Model for Skill Enhancement Course - Skill based Practical Course -2 Credit Course	
CCE-50% (50) & SEE-50% (50)	
Exam Pattern	Marks
Lab work assessment or Project based Assessment	20
Viva voce/Lab quiz	20
Attendance & Performance	10
Continuous and Comprehensive Evaluation	50
Semester-End Evaluation	50

Component	Marks	SEE Duration Hrs.	Evaluation - Weightage CCE: SEE = 50:50			
			CCE Marks	SEE Marks	Total Marks	Total Marks To be Converted for
Theory	75	2$\frac{1}{2}$	75	75	150	75
Practical	25	2	25	25	50	25
Total	100	NA	100	100	200	100

*Similarly Model for Theory 4 Credits Courses and Practical 2 Credit Courses be formulated and can be implemented after discussion and approval.



Theory Question Paper Pattern
Semester End Examination (SEE)

Instructions:

- All Units/ Module carry equal weightage of 15 Marks each
- There must be One Question from each Unit/ Module
- Each Subtopic/ Chapter must be given due weightage in the Question paper
- Time duration: 2½Hours

The Theory Question Paper Skeleton is as follows

Question 1 (Unit/Module 1)		Marks
A	Answer all the Three.	03
B	Answer Any Two out of Three	06
C	Answer Any One out of Two	06
Total Marks Question 1		15
Question 2 (Unit/Module 2)		Marks
A	Answer all the Three.	03
B	Answer Any Two out of Three	06
C	Answer Any One out of Two	06
Total Marks Question 2		15
Question 3 (Unit/Module 3)		Marks
A	Answer all the Three.	03
B	Answer Any Two out of Three	06
C	Answer Any One out of Two	06
Total Marks Question 3		15
Question 4 (Unit/Module 4)		Marks
A	Answer all the Three.	03
B	Answer Any Two out of Three	06
C	Answer Any One out of Two	06
Total Marks Question 4		15
Question 5 (Unit/Module 5)		Marks
A	Answer all the Three.	03
B	Answer Any Two out of Three	06
C	Answer Any One out of Two	06
Total Marks Question 5		15



Practical Question Paper Pattern

Semester End Examination (SEE)

Instructions:

- Certified journal is must and minimum requirement to appearing for semester end practical examination.
- Should have at least 75% attendance in practical sessions during the semester.
- Time duration: **2 Hours**.

Exam Pattern	Marks
Formula, observations and Observation Table with proper units	04
Setting up the apparatus / circuit connections	04
Taking readings and tabulating	06
Calculations and Graph	06
Viva	05
Semester-End Evaluation	25



B.Sc. Honours/ Honours with Research in Physics

(NCrF Level- 4.5 First Year – Certificate in Physics)

Semester I

Course Category	Major-1
Title of the Course	<u>Physics-1: Concept of Physics-1</u>
Course Credit	03
Teaching Hours per Semester	45
Total Marks	75

Course Objectives

Students will be able to study

- 1) Physical quantity and its units, importance of units, SI unit system and idea of Dimension
- 2) Difference between vector and scalar quantity, scalar and vector product, Differential Calculus & Integral Calculus and its application.
- 3) About basic semiconductor, N type & P type semiconductor, P-N Junction Diode
- 4) Classical mechanics and Newton's Laws, the response of the object to external forces and their collisions.
- 5) Dynamics of Planetary motion and gravitational field
- 6) Elasticity and different Modulus.

Course Outcomes – Cos

Students will be able to understand/ get knowledge about

- 1) Fundamental unit and different unit system, Fixing units, tabulation of observations, analysis of data (graphical/analytical).
- 2) Accuracy of measurement and sources of errors, importance of significant figures.
- 3) Vector and scalar quantity, Differential Calculus & Integral Calculus and its application.
- 4) Pure and impure semiconductor, N type & P type semiconductor, P-N Junction Diode.
- 5) Newtonian Mechanics and motion of the object.
- 6) Gravitational Law, Kepler's Law and Planetary Motion.
- 7) Elasticity, Stress and Strain, Knowledge of how various elastic moduli can be determined.



1	Employability/Entrepreneurship/Skill Development પર કેન્દ્રિત થયેલ છે કે નહિ ?				Yes	
2	Value added Courses Imparting Transferable and Life Skills ના ગુણો ધરાવે છે ?				Yes	
3	Major	Yes	Minor		No	
	Skill Enhancement Courses	No	Ability Enhancement Courses		No	
	Value Added Courses	No	Exit/ Vocational Courses		No	
4	Holistic Education	Yes	Multidisciplinary	No	Interdisciplinary	No
5	દિવ્યાંગ માટે વિષય અંતર્ગત આનુસાંગિક જોગવાઈ કરાયેલ છે ?				Yes	
6	New India Literacy Programme (NILP) મુજબનો વિષય છે ?				Yes	
7	Swayam પ્લેટફોર્મ પરના MOOC વિષય પર આધારિત આ વિષય છે ?				No	
8	ઈન્ડિયન નોલેજ સીસ્ટમ (IKS) પર આધારિત વિષય છે ?				No	



Unit No.	Topics	Hours	Marks
1	<p>Units and Measurement: Measurement, Fundamental and Derived Quantities, SI units, SI prefixes, Definition of base units, Dimension, Use of Dimension, Limitation of Dimensional method, Numerical Examples.</p> <p>Vectors algebra and calculus: Vectors and Scalars, Addition of Vectors, Resolution of Vectors, Scalar and Vector Products, Differential Calculus as Rate Measurer, Differential Calculus as Maxima and Minima, Integral Calculus, Numerical Examples.</p>	9	15
2	<p>Semiconductors Physics: Semiconductor materials, Energy Bands in solids-metals insulators and semiconductor, Intrinsic Semiconductor, Crystal Structure of Intrinsic semiconductor, Charge Carriers in Intrinsic semiconductor, Conduction in Intrinsic semiconductor, Extrinsic semiconductors, N-type Semiconductor, P-type Semiconductor, Effect of temperature on conductivity of Intrinsic and Extrinsic Semiconductor, PN junction, Formation of PN junction, PN junction with Forward and Reverse biasing, Reverse Breakdown, V-I</p>	9	15



	Characteristic of a PN junction diode, The ideal diode, Static and Dynamics Resistance of a diode. Zener Diode, Zener Breakdown, V-I Characteristic of a Zener diode, Numerical Examples		
3	Laws of Motion & Dynamics of System of Particles: Frames of reference, Newton's Laws of motion, Kinetic Energy, Work and Work-Energy theorem, Calculation of Work Done, Conservative and Non-Conservative force (only definition), Potential Energy and Conservation of Energy, Definition of Centre of Mass, Centre of Mass of Two Particles and several group of Particles, Linear Momentum and its Conservation Principle, Rocket Propulsion, Collisions, Inelastic Collisions, Elastic Collisions (one dimension and two dimension explanation), Numerical Examples.	9	15
4	Gravitation: Newton's Law of Gravitation, Gravitation Potential Energy, Gravitation potential, Gravitational field, Calculation of Gravitational Potential and Field due to a Point Mass, Kepler's Laws, Motion of Planets and Satellite in circular orbit.	9	15



	Geosynchronous orbits, Weightlessness, Escape velocity, Numerical Examples		
5	Elasticity: Elasticity, Stress and Strain, Hooke's law, Relation between Longitudinal Stress and Strain(stress-strain diagram), Modulus of Elasticity, Poission's Ratio, Determination of Young modulus by Searles method, Numerical Examples	9	15

Reference Books:

REFERENCE BOOKS for Unit 1,2:

1. Concept of physics By H C Verma Publisher:Bharati Bhawan
2. Sears and Zemansky's University Physics with modern physics By H D Young, Publisher: PEARSON
3. Basic electronics and linear circuits By N N Bhargav A, D C Kushreshtha, S C Gupta
4. Elements of Electronics by Bagde & Singh Publication S. Chand

REFERENCE BOOKS for Unit 3, 4, 5:

1. Concept of physics By H C Verma Publisher:Bharati Bhawan
2. Sears and Zemansky's University Physics with modern physics By H D Young, Publisher: PEARSON



Other Reference Books:

1. Mechanics Berkeley Physics course Vol 1
2. Lectures on physics, R.P.Feynman, Vol-1
3. Physics – Resnick and Halliday
4. Principles of electronics By V.K.Mehta Publisher: S.Chand



B.Sc. Honours/ Honours with Research in Physics
(NCrF Level- 4.5 First Year – Certificate in Physics)
Semester I

Course Category	Major-2
Title of the Course	<u>Physics 2: Concept of Physics-2</u>
Course Credit	03
Teaching Hours per Semester	45
Total Marks	75

Course Objectives

Students will be able to study

- 1) Basic electronics components, voltage source, current source, RC circuit.
- 2) Basic idea of modern physics like wave – particle duality and physics of atom.
- 3) Rotational motion, moment of inertia, conservation of angular momentum etc.
- 4) Simple Harmonic Motion, damped oscillation and forced oscillation.
- 5) Fluid Mechanics: pascal’s Law, Bernoulli;s equation, Viscosity, surface Tension

Course Outcomes – Cos

Students will be able to understand/ get knowledge about

- 1) Basic electronics components like R,L,C, voltage source, current source, Capacitor Charging and Discharging, RC circuit.
- 2) Basic idea of modern physics : Photoelectric effect, Hydrogen Spectra, Atomic Models.
- 3) Rotational motion, Torque, Moment of inertia of different body rigid body , conservation of angular momentum etc.
- 4) Simple Harmonic Motion, Terms associated with SHM,Energy conservation in SHM, damped oscillation and forced oscillation.
- 5) Fluid Mechanics: Pascal’s Law, Bernoulli;s equation, Viscosity, surface Tension



1	Employability/Entrepreneurship/Skill Development પર કેન્દ્રિત થયેલ છે કે નહિ ?				Yes	
2	Value added Courses Imparting Transferable and Life Skills ના ગુણો ધરાવે છે ?				Yes	
3	Major	Yes	Minor		No	
	Skill Enhancement Courses	No	Ability Enhancement Courses		No	
	Value Added Courses	No	Exit/ Vocational Courses		No	
4	Holistic Education	Yes	Multidisciplinary	No	Interdisciplinary	No
5	દિવ્યાંગ માટે વિષય અંતર્ગત આનુસંગિક જોગવાઈ કરાયેલ છે ?				Yes	
6	New India Literacy Programme (NILP) મુજબનો વિષય છે ?				Yes	
7	Swayam પ્લેટફોર્મ પરના MOOC વિષય પર આધારિત આ વિષય છે ?				No	
8	ઇન્ડિયન નોલેજ સીસ્ટમ (IKS) પર આધારિત વિષય છે ?				No	



Unit No.	Topics	Hours	Marks
1	Basic electronics and Linear circuits: Electronic components, Basic idea of Passive components (Resistors, Capacitors, Inductors) and Active components, Source of Electric Power, Batteries, Concept of Voltage Sources, Ideal Voltage Source, Practical Voltage Source, Concept of Current Sources, Practical Current Source, Conversion of Voltage Source into Current Source and vice versa, RC circuits analysis and time constant. (Capacitor charging and discharging). Numerical Examples.	9	15
2	Wave-Particle Duality and Physics of Atom: Photon theory of light, Photoelectric Effect, Matter Waves, Early Atomic Models, Hydrogen Spectra, Difficulties with Rutherford's model, Bohr's Model, Limitations of Bohr's model. Numericals	9	15
3	Rotational Mechanics: Angular velocity and Angular Acceleration, Torque of a Force about the Axis of Rotation, Moment of Inertia and $\tau = I\alpha$, Moment of Inertia of rectangular Bar, Moment of Inertia of Solid	9	15



	Cylinder, Angular Momentum, Conservation of angular momentum, Kinetic Energy of a Rigid body, Two Theorems on Moment of Inertia. Numerical Examples.		
4	Oscillations: Simple Harmonic Motion, Equation for SHM and its Solutions, Terms associated with SHM like (Time Period, Frequency, Amplitude, and Phase), SHM as a Projection of Circular Motion, Energy conservation in simple harmonic motion, Kinetic and Potential Energy, Damped Oscillations, Forced Oscillation and Resonance, Numerical Examples	9	15
5	Fluid Mechanics: Fluids, Pressure in a fluid, Pascal's law, Atmospheric Pressure and Barometer, Archimedes' Principle, Pressure difference and Buoyant force in accelerating fluids, Flow in fluids, Steady and Turbulent Force, Streamline flow, Equation of continuity, Bernoulli's Equation, Application of Bernoulli's principle, Viscosity, Surface tension, Numerical Examples	9	15



REFERENCE BOOKS for Unit 1:

1. Basic electronics and linear circuits By N N Bhargav A, D C Kushreshtha, S C Gupta
2. Elements of Electronics by Bagde & Singh Publication S. Chand

REFERENCE BOOKS for Unit 2:

1. Concept of physics By H C Verma Part 2 Publisher: Bharati Bhawan
2. Sears and Zemansky's University Physics with modern physics
By H D Young, Publisher: PEARSON

Reference Books for unit 3,4,5:

1. Concept of physics By H C Verma Part 1 Publisher: Bharati Bhawan
2. Sears and Zemansky's University Physics with modern physics
By H D Young, Publisher: PEARSON

Other Reference Books:

1. Mechanics Berkeley Physics course Vol 1
2. Lectures on physics, R.P.Feynman, Vol-1
3. Physics – Resnick and Halliday
4. Principles of electronics By V.K.Mehta Publisher: S.Chand



B.Sc. Honours/ Honours with Research in Physics

(NCrF Level- 4.5 First Year – Certificate in **Physics**)

Semester I

Course Category	Major Practical -1
Title of the Course	Experimental Analysis In Physics 1
Course Credit	01
Teaching Hours per Semester	30
Total Marks	25

Course Objectives

The objectives of the course are as following.

1. To make students aware of the basic Mechanical and Electrical Instruments
2. To enhance the basic skills of Performing experiment
3. The objective of this course is also to give students some basic introduction about accuracy of measurement and sources of errors, importance of significant figures.
4. To impart the skill of dealing with many electrical, electronic and mechanical equipment
5. To develop their working skill/ scientific temperament for performing experiment.

Course Outcomes – Cos

1. Students will be able to know experimental technique for Physics
2. Students will get Hands on experience of different equipment.
3. Students will develop the following skills
 - Fixing units, tabulation of observations, analysis of data (graphical/analytical).
 - Accuracy of measurement and sources of errors, importance of significant figures.
 - Knowledge of how g can be determined experimentally and derive satisfaction.
 - Knowledge of how various elastic moduli can be determined experimentally.
4. Students will be study practically the char. of simple diode and Zener diode.



1	Employability/Entrepreneurship/Skill Development પર કેન્દ્રિત થયેલ છે કે નહીં ?				Yes	
2	Value added Courses Imparting Transferable and Life Skills ના ગુણો ધરાવે છે ?				Yes	
3	Major	Yes	Minor		No	
	Skill Enhancement Courses	No	Ability Enhancement Courses		No	
	Value Added Courses	No	Exit/ Vocational Courses		No	
4	Holistic Education	Yes	Multidisciplinary	No	Interdisciplinary	No
5	દિવ્યાંગ માટે વિષય અંતર્ગત આનુસાંગિક જોગવાઈ કરાયેલ છે ?				Yes	
6	New India Literacy Programme (NILP) મુજબનો વિષય છે ?				Yes	
7	Swayam પ્લેટફોર્મ પરના MOOC વિષય પર આધારિત આવિષય છે ?				Yes/No	
8	ઇન્ડિયન નોલેજ સીસ્ટમ (IKS) પર આધારિત વિષય છે ?				Yes	



Pr.No.	Practical
1	To Study of errors in observation using Vernier Caliper.
2	To Study of errors in observation using Micrometer Screw.
3	To determine 'g' and radius of gyration using Bar Pendulum. (using $L^2 \rightarrow LT^2$)
4	To determine 'g' and equivalent length(l_0) of simple pendulum and radius of gyration using Bar Pendulum. (using $T \rightarrow L$)
5	To determine the Young's Modulus of long wire by Searl's method.
6	To determine the Poisson's ratio of rubber tube.
7	To study of Tangent galvanometer (Constant of T.G. & Verification of Ohm's law, to find reduction factor of TG)
8	To determine Low resistance by Potentiometer.
9	To study Semiconductor Diode Characteristics.
10	To study Zener diode Characteristics.

Reference Books:

1. B. Sc. Practical Physics by C. L. Arora Pub: S. Chand
2. A text of Practical Physics By Indu Prakash & Ramkrishna
3. Practical Physics by G. L. Gupta and V. Kumar Pub. Pragati Prakashan, Meerut
4. B. Saraf Physics through experiments Vol. I & II.



B.Sc. Honours/ Honours with Research in Physics
(NCrF Level- 4.5 First Year – Certificate in **Physics**)

Semester I

Course Category	Major Practical -2
Title of the Course	Experimental Analysis In Physics 2
Course Credit	01
Teaching Hours per Semester	30
Total Marks	25

Course Objectives

The objectives of the course are as following.

1. To make students aware of the basic Mechanical and Electrical Instruments
2. To enhance the basic skills of Performing experiment
3. The objective of this course is also to give students some basic introduction about accuracy of measurement and sources of errors, importance of significant figures.
4. To impart the skill of dealing with many electrical, electronic and mechanical equipment
5. To develop their working skill/ scientific temperament for performing experiment

Course Outcomes – Cos

Students will be able to understand/ get knowledge about

- 1) Fundamental unit and different unit system, Fixing units, tabulation of observations, analysis of data (graphical/analytical).
- 2) Accuracy of measurement and sources of errors, importance of significant figures.
- 3) Students will develop the skill to understand the experimental knowledge of
 - Moment of Inertia
 - RC time constant of circuit
 - series parallel combination of capacitor
 - resistor and inductor
 - Simple harmonic motion
 - charging- discharging of capacitor



1	Employability/Entrepreneurship/Skill Development પરકેન્દ્રિતથયેલછેકેનહિ ?	Yes				
2	Value added Courses Imparting Transferable and Life Skillsનાગુણોધરાવે છે?	Yes				
3	Major	Yes	Minor	No		
	Skill Enhancement Courses	No	Ability Enhancement Courses	No		
	Value Added Courses	No	Exit/ Vocational Courses	No		
4	Holistic Education	Yes	Multidisciplinary	No	Interdisciplinary	No
5	દિવ્યાંગમાટેવિષયઅંતર્ગતઆનુસાંગિકજોગવાઈકરાયેલછે ?					Yes
6	New India Literacy Programme (NILP) મુજબનોવિષયછે ?					Yes
7	Swayam પ્લેટફોર્મપરના MOOC વિષયપરઆધારિતઆવિષયછે ?					No
8	ઈન્ડિયનનોલેજસીસ્ટમ (IKS) પરઆધારિતવિષયછે ?					No

Pr.No.	Practical
1	To determine the Moment of Inertia of rectangular body by Bifilar Suspension.
2	To prove law of perpendicular axis by Bifilar Suspension.
3	To study charging of capacitor and RC time constant.
4	To study discharging of capacitor and RC time constant.
5	To determine Low resistance by Projection method.
6	To study the series and parallel connection of the capacitor.
7	To study the series and parallel connection of the resistor.
8	To study resonance in LCR circuit.
9	To study SHM using simple pendulum.

Reference Books:

1. B. Sc. Practical Physics by C. L. Arora Pub: S. Chand
2. A text of Practical Physics By Indu Prakash & Ramkrishna
3. Practical Physics by G. L. Gupta and V. Kumar Pub. Pragati Prakashan, Meerut
4. B. Saraf Physics through experiments Vol. I & II.



B.Sc. Honours/ Honours with Research in Physics

(NCrF Level- 4.5 First Year – Certificate in Physics)

Semester I

Course Category	Minor-1
Title of the Course	<u>Physics 1: Concept of Physics-1</u>
Course Credit	03
Teaching Hours per Semester	45
Total Marks	75

Course Objectives

Students will be able to study

- 1) Physical quantity and its units, importance of units, SI unit system and idea of Dimension
- 2) Difference between vector and scalar quantity, scalar and vector product, Differential Calculus & Integral Calculus and its application.
- 3) About basic semiconductor, N type & P type semiconductor, P-N Junction Diode
- 4) Classical mechanics and Newton's Laws, the response of the object to external forces and their collisions.
- 5) Dynamics of Planetary motion and gravitational field
- 6) Elasticity and different Modulus.

Course Outcomes – Cos

Students will be able to understand/ get knowledge about

- 1) Fundamental unit and different unit system, Fixing units, tabulation of observations, analysis of data (graphical/analytical).
- 2) Accuracy of measurement and sources of errors, importance of significant figures.
- 3) Vector and scalar quantity, Differential Calculus & Integral Calculus and its application.
- 4) Pure and impure semiconductor, N type & P type semiconductor, P-N Junction Diode.
- 5) Newtonian Mechanics and motion of the object.
- 6) Gravitational Law, Kepler's Law and Planetary Motion. Elasticity, Stress and Stress, Knowledge of how various elastic moduli can be



determined

1	Employability/Entrepreneurship/Skill Development પરકેન્દ્રિતથયેલછેકેનહિ ?				Yes	
2	Value added Courses Imparting Transferable and Life Skillsનાગુણોધરાવેછે?				Yes	
3	Major	No	Minor	Yes		
	Skill Enhancement Courses	No	Ability Enhancement Courses	No		
	Value Added Courses	No	Exit/ Vocational Courses	No		
4	Holistic Education	Yes	Multidisciplinary	No	Interdisciplinary	No
5	દિવ્યાંગમાટેવિષયઅંતર્ગતઆનુસાંગિકજોગવાઈકરાયેલછે ?				Yes	
6	New India Literacy Programme (NILP) મુજબનોવિષયછે ?				Yes	
7	Swayam પ્લેટફોર્મપરના MOOC વિષયપરઆધારિતઆવિષયછે ?				No	
8	ઇન્ડિયનનોલેજસીસ્ટમ (IKS) પરઆધારિતવિષયછે ?				No	



Unit No.	Topics	Hours	Marks
1	<p>Units and Measurement : Measurement, Fundamental and Derived Quantities, SI units, SI prefixes, Definition of base units, Dimension, Use of Dimension, Limitation of Dimensional method, Numerical Examples.</p> <p>Vectors algebra and calculus: Vectors and Scalars, Addition of Vectors, Resolution of Vectors, Scalar and Vector Products, Differential Calculus as Rate Measurer, Differential Calculus as Maxima and Minima, Integral Calculus, Numerical Examples.</p>	9	15
2	<p>Semiconductors Physics: Semiconductor materials, Energy Bands in solids-metals insulators and semiconductor, Intrinsic Semiconductor, Crystal Structure of Intrinsic semiconductor, Charge Carriers in Intrinsic semiconductor, Conduction in Intrinsic semiconductor, Extrinsic semiconductors, N-type Semiconductor, P-type Semiconductor, Effect of temperature on conductivity of Intrinsic and Extrinsic Semiconductor, PN junction, Formation of PN junction, PN junction with Forward and Reverse biasing, Reverse Breakdown, V-I</p>	9	15



	Characteristic of a PN junction diode, The ideal diode, Static and Dynamics Resistance of a diode. Zener Diode, Zener Breakdown, V-I Characteristic of a Zener diode, Numerical Examples		
3	Laws of Motion & Dynamics of System of Particles: Frames of reference, Newton's Laws of motion, Kinetic Energy, Work and Work-Energy theorem, Calculation of Work Done, Conservative and Non-Conservative force (only definition), Potential Energy and Conservation of Energy, Definition of Center of Mass, Center of Mass of Two Particles and several group of Particles, Linear Momentum and its Conservation Principle, Rocket Propulsion, Collisions, Inelastic Collisions, Elastic Collisions (one dimension and two dimension explanation), Numerical Examples.	9	15
4	Gravitation: Newton's Law of Gravitation, Gravitation Potential Energy, Gravitation potential, Gravitational field, Calculation of Gravitational Potential and Field due to a Point Mass, Kepler's Laws, Motion of Planets and Satellite in circular orbit.	9	15



	Geosynchronous orbits, Weightlessness, Escape velocity, Numerical Examples		
5	Elasticity: Elasticity, Stress and Strain, Hooke's law, Relation between Longitudinal Stress and Strain(stress-strain diagram), Modulus of Elasticity, Poission's Ratio, Determination of Young modulus by Searles method, Numerical Examples	9	15

Reference Books:

REFERENCE BOOKS for Unit 1,2:

1. Concept of physics By H C Verma Publisher:Bharati Bhawan
2. Sears and Zemansky's University Physics with modern physics By H D Young, Publisher: PEARSON
3. Basic electronics and linear circuits By N N Bhargav A, D C Kushreshtha, S C Gupta
4. Elements of Electronics by Bagde & Singh Publication S. Chand

REFERENCE BOOKS for Unit 3, 4, 5:

1. Concept of physics By H C Verma Publisher:Bharati Bhawan
2. Sears and Zemansky's University Physics with modern physics By H D Young, Publisher: PEARSON

Other Reference Books:

- 1 Mechanics Berkeley Physics course Vol 1
 - 2 Lectures on physics, R.P.Feynman, Vol-1
 - 3 Physics – Resnick and Halliday
 - 4 Principles of electronics By V.K.Mehta Publisher: S.Chand
- B.Sc. Honours/ Honours with Research in Physics**



(NCrF Level- 4.5 First Year – Certificate in **Physics**
Semester I

Course Category	Minor Practical -1
Title of the Course	Physics-1P: Experimental Analysis In Physics-1
Course Credit	01
Teaching Hours per Semester	30
Total Marks	25

Course Objectives

The objectives of the course are as following.

1. To make students aware of the basic Mechanical and Electrical Instruments
2. To enhance the basic skills of Performing experiment
3. The objective of this course is also to give students some basic introduction about accuracy of measurement and sources of errors, importance of significant figures.
4. To impart the skill of dealing with many electrical, electronic and mechanical equipment
5. To develop their working skill/ scientific temperament for performing experiment.

Course Outcomes – Cos

1. Students will be able to know experimental technique for Physics
2. Students will get Hands on experience of different equipment.
3. Students will develop the following skills
 - Fixing units, tabulation of observations, analysis of data (graphical/analytical).
 - Accuracy of measurement and sources of errors, importance of significant figures.
 - Knowledge of how g can be determined experimentally and derive satisfaction.
 - Knowledge of how various elastic moduli can be determined experimentally.
4. Students will be study practically the char. of simple diode and Zener diode.



1	Employability/Entrepreneurship/Skill Development પર કેન્દ્રિત થયેલ છે કે નહિ ?				Yes	
2	Value added Courses Imparting Transferable and Life Skills ના ગુણો ધરાવે છે ?				Yes	
3	Major	No	Minor		Yes	
	Skill Enhancement Courses	No	Ability Enhancement Courses		No	
	Value Added Courses	No	Exit/ Vocational Courses		No	
4	Holistic Education	Yes	Multidisciplinary	No	Interdisciplinary	No
5	દિવ્યાંગ માટે વિષય અંતર્ગત આનુસાંગિક જોગવાઈ કરાયેલ છે ?				Yes	
6	New India Literacy Programme (NILP) મુજબનો વિષય છે ?				Yes	
7	Swayam પ્લેટફોર્મ પરના MOOC વિષય પર આધારિત આ વિષય છે ?				No	
8	ઇન્ડિયન નોલેજ સીસ્ટમ (IKS) પર આધારિત વિષય છે ?				No	



Pr.No.	Practical
1	To Study of errors in observation using Vernier Caliper.
2	To Study of errors in observation using Micrometer Screw.
3	To determine 'g' and radius of gyration using Bar Pendulum. (using $L^2 \rightarrow LT^2$)
4	To determine 'g' and equivalent length(l_0) of simple pendulum and radius of gyration using Bar Pendulum. (using $T \rightarrow L$)
5	To determine the Young's Modulus of long wire by Searl's method.
6	To determine the Poisson's ratio of rubber tube.
7	To study of Tangent galvanometer (Constant of T.G. & Verification of Ohm's law, to find reduction factor of TG)
8	To determine Low resistance by Potentiometer.
9	To study Semiconductor Diode Characteristics.
10	To study Zener diode Characteristics.

Reference Books:

1. B. Sc. Practical Physics by C. L. Arora Pub: S. Chand
2. A text of Practical Physics By Indu Prakash & Ramkrishna
3. Practical Physics by G. L. Gupta and V. Kumar Pub. Pragati Prakashan, Meerut
4. B. Saraf Physics through experiments Vol. I & II.



MDC/IDC Course Offered by BoS of Physics

Course Category	MDC/IDC
Title of the Course	<u>Physics-1:Introduction to Physics-1</u>
Course Credit	03
Teaching Hours per Semester	45
Total Marks	75



Semester I

Course Category	MDC/IDC
Title of the Course	<u>Physics-1:Introduction to Physics-1</u>
Course Credit	03
Teaching Hours per Semester	45
Total Marks	75

Course Objectives

Students will be able to study

- 1) Physical quantity and its units, importance of units, SI unit system and idea of Dimension
- 2) Difference between vector and scalar quantity, scalar and vector product, Differential Calculus & Integral Calculus and its application.
- 3) About basic semiconductor, N type & P type semiconductor, P-N Junction Diode
- 4) Classical mechanics and Newton's Laws, the response of the object to external forces and their collisions.
- 5) Dynamics of Planetary motion and gravitational field
- 6) Elasticity and different Modulus.

Course Outcomes – Cos

Students will be able to understand/ get knowledge about

- 1) Fundamental unit and different unit system, Fixing units, tabulation of observations, analysis of data (graphical/analytical).
- 2) Accuracy of measurement and sources of errors, importance of significant figures.
- 3) Vector and scalar quantity.
- 4) Pure and impure semiconductor, N type & P type semiconductor, P-N Junction Diode.
- 5) Newtonian Mechanics and motion of the object.
- 6) Gravitational Law, Kepler's Law and Planetary Motion Elasticity, Stress and Stress, Knowledge of how various elastic moduli can be determined

1	Employability/Entrepreneurship/Skill Development પર કેન્દ્રિત થયેલ છે કે નહિ ?	Yes
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2	Value added Courses Imparting Transferable and Life Skillsનાગુણોધરાવેછે?					Yes
3	Major	No	Minor			Yes/No
	Skill Enhancement Courses	No	Ability Enhancement Courses			Yes/No
	Value Added Courses	Yes/No	Exit/ Vocational Courses			Yes/No
4	Holistic Education	Yes	Multidisciplinary	Yes	Interdisciplinary	Yes/No
5	દિવ્યાંગમાટેવિષયઅંતર્ગતઆનુસાંગિકજોગવાઈકરાવેલછે ?					Yes
6	New India Literacy Programme (NILP) મુજબનોવિષયછે ?					Yes
7	Swayam પ્લેટફોર્મપરના MOOC વિષયપરઆધારિતઆવિષયછે ?					Yes/No
8	ઇન્ડીયનનોલેજસીસ્ટમ (IKS) પરઆધારિતવિષયછે ?					Yes



Unit No.	Topics	Hours	Marks
1	Unit system: Measurement, Fundamental and Derived Quantities, SI units, SI prefixes, Definition of base units, Dimension, Use of Dimension, Limitation of Dimensional method, Vectors and Scalars, Addition of Vectors, Scalar and Vector Products, Numerical Examples.	9	15
2	Laws of Motion: Frames of reference, Newton's Laws of motion, Kinetic Energy, Work and Work-Energy theorem, Calculation of Work Done, Conservative and Non-Conservative force (only definition), Potential Energy and Conservation of Energy, Definition of Centre of Mass, Linear Momentum and its Conservation Principle, Numerical Examples.	9	15
3	Gravity: Newton's Law of Gravitation, Gravitation Potential Energy, Gravitation potential, Gravitational field, Calculation of Gravitational Potential and Field due to a Point Mass, Kepler's Laws, Motion of Planets and Satellite in circular orbit. Geosynchronous orbits, Weightlessness, Escape velocity, Numerical Examples	9	15



4	Mechanical properties of Solid-Elasticity: Elasticity, Stress and Strain, Hooke's law, Relation between Longitudinal Stress and Strain(stress-strain diagram), Modulus of Elasticity, Poission's Ratio, Determination of Young modulus by Searles method, Numerical Examples	9	15
5	Fundamentals of Electronics: Semiconductor materials, Energy Bands in solids-metals insulators and semiconductor, Intrinsic Semiconductor, Extrinsic semiconductors, N-type Semiconductor, P-type Semiconductor, Effect of temperature on conductivity of Intrinsic and Extrinsic Semiconductor, PN junction, Formation of PN junction, PN junction with Forward and Reverse biasing, Reverse Breakdown, V-I Characteristic of a PN junction diode, The ideal diode, Zener Diode, Zener Breakdown, V-I Characteristic of a Zener diode, Numerical Examples	9	15

Reference Books:

REFERENCE BOOKS for Unit 1,2:

1. Concept of physics By H C Verma Publisher:Bharati Bhawan
2. Sears and Zemansky's University Physics with modern physics By



H D Young, Publisher: PEARSON

3. Basic electronics and linear circuits By N N Bhargav A, D C Kushreshtha,
S C Gupta

4. Elements of Electronics by Bagde & Singh Publication S. Chand

REFERENCE BOOKS for Unit 3, 4, 5:

1. Concept of physics By H C Verma Publisher: Bharati Bhawan

2. Sears and Zemansky's University Physics with modern physics By

H D Young, Publisher: PEARSON

Other Reference Books:

1 Mechanics Berkeley Physics course Vol 1

2 Lectures on physics, R.P.Feynman, Vol-1

3 Physics – Resnick and Halliday

4 Principles of electronics By V.K.Mehta Publisher: S.Chand



Semester I

Course Category	MDC/
Title of the Course	Experimental Study in Physics 1
Course Credit	01
Teaching Hours per Semester	30
Total Marks	25

Course Objectives

The objectives of the course are as following.

5. To make students aware of the basic Mechanical and Electrical Instruments
6. To enhance the basic skills of Performing experiment
7. The objective of this course is also to give students some basic introduction about accuracy of measurement and sources of errors, importance of significant figures.
8. To impart the skill of dealing with many electrical, electronic and mechanical equipment
5. To develop their working skill/ scientific temperament for performing experiment

Course Outcomes – Cos

1. Students will be able to know experimental technique for Physics
2. Students will get Hands on experience of different equipment.
3. Students will develop the following skills
 - Fixing units, tabulation of observations, analysis of data (graphical/analytical).
 - Accuracy of measurement and sources of errors, importance of significant figures.
 - Knowledge of how g can be determined experimentally and derive satisfaction.
 - Knowledge of how various elastic moduli can be determined experimentally.
4. Students will be study practically the char. of simple diode and Zener diode.



1	Employability/Entrepreneurship/Skill Development પરકેન્દ્રિતથયેલછેકેનહિ ?	Yes				
2	Value added Courses Imparting Transferable and Life Skillsનાગુણોધરાવેછે?	Yes				
3	Major	No	Minor	No		
	Skill Enhancement Courses	Yes/No	Ability Enhancement Courses	Yes/No		
	Value Added Courses	Yes/No	Exit/ Vocational Courses	Yes/No		
4	Holistic Education	Yes/No	Multidisciplinary	Yes	Interdisciplinary	Yes/No
5	દિવ્યાંગમાટેવિષયઅંતર્ગતઆનુસાંગિકજોગવાઈકરાયેલછે ?					Yes
6	New India Literacy Programme (NILP) મુજબનોવિષયછે ?					Yes
7	Swayam પ્લેટફોર્મપરના MOOC વિષયપરઆધારિતઆવિષયછે ?					Yes/No
8	ઈન્ડીયનનોલેજસીસ્ટમ (IKS) પરઆધારિતવિષયછે ?					Yes

Pr.No.	Practical
1	To Study of errors in observation using Vernier Caliper.
2	To Study of errors in observation using Micrometer Screw.
3	To determine 'g' and radius of gyration using Bar Pendulum. (using $L^2 \rightarrow LT^2$)
4	To determine 'g' and equivalent length(l_0) of simple pendulum and radius of gyration using Bar Pendulum. (using $T \rightarrow L$)
5	To determine the Young's Modulus of long wire by Searl's method.
6	To determine the Poisson's ratio of rubber tube.
7	To study of Tangent galvanometer (Constant of T.G. & Verification of Ohm's law, to find reduction factor of TG)
8	To determine Low resistance by Potentiometer.
9	To study Semiconductor Diode Characteristics.
10	To study Zener diode Characteristics.

Reference Books:

1. B. Sc. Practical Physics by C. L. Arora Pub: S. Chand
2. A text of Practical Physics By Indu Prakash & Ramkrishna
3. Practical Physics by G. L. Gupta and V. Kumar Pub. Pragati Prakashan, Meerut
4. B. Saraf Physics through experiments Vol. I & II.



Semester I

SEC Course Offered by BoS of Physics

Course Category	SEC-1 PHYSICS: Practical Skill
Title of the Course	SKILL ENHANCEMENT IN BASIC ELECTRICAL APPLIANCES
Course Credit	02
Teaching Hours per Semester	60
Total Marks	50



Semester I

Course Category	SEC-1 PHYSICS: Practical Skill
Title of the Course	SKILL ENHANCEMENT IN BASIC ELECTRICAL APPLIANCES
Course Credit	02
Teaching Hours per Semester	60
Total Marks	50

Course Objectives

The objectives of the course are as following.

1. To make students aware of the basic electrical components in appliances which they come across in daily life.
2. To enhance the basic skills of in the usage of electrical appliances. Such as making broken connections in domestic appliances, winding fuses, finding common faults, and mending them.
3. The objective of this course is also to give students some basic introduction to some electrical physical entities and laws of physics governing the behaviors of many electrical and electronic phenomena.
4. To impart the skill of dealing with many electrical components. To test their working.

Course Outcomes – Cos

Students will enhance or develop the following skills at the end of the course.

1. They will make themselves aware of the basic electrical components. They would be able to mend the very common faults in domestic electrical supply and appliances. Such as making connections in pin, plug, fuse etc.
2. They would develop the concepts of Safety from electric shock hazards.
3. They would develop the concepts of insulation and grounding in electrical network.
4. They would learn about very basic components such as Resistors, Capacitors, Inductors, etc.
5. They would learn to practically use the above given components in electrical circuits. They learn to identify the connections of these devices and test their working.
6. They would learn to use how to measure different physical electrical entities such as Voltage, Current, Resistance with the proper usage of Voltmeter, Ammeter, Multi-meter.



1	Employability/Entrepreneurship/Skill Development પર કેન્દ્રિત થયેલ છે કે નહિ ?				Yes	
2	Value added Courses Imparting Transferable and Life Skillsનાગુણોધરાવેછે?				Yes	
3	Major	No	Minor		No	
	Skill Enhancement Courses	Yes	Ability Enhancement Courses		No	
	Value Added Courses	No	Exit/ Vocational Courses		No	
4	Holistic Education	Yes	Multidisciplinary	No	Interdisciplinary	No
5	દિવ્યાંગમાટેવિષયઅંતર્ગતઆનુસાંગિકજોગવાઈકરાયેલ છે ?				No	
6	New India Literacy Programme (NILP) મુજબનોવિષય છે ?				Yes	
7	Swayam પ્લેટફોર્મપરના MOOC વિષયપરઆધારિતઆવિષય છે ?				No	
8	ઇન્ડીયન નોલેજ સીસ્ટમ (IKS) પરઆધારિતવિષય છે ?				No	

Unit No.	Topics	Hours	Marks
1	<p>INTRODUCTION TO BASIC ELECTRICAL COMPONENTS AND CIRCUITS.</p> <ol style="list-style-type: none"> 1. Concepts of electrical energy and electrical power. Types of electrical energy sources, basic electrical circuits, concept of voltage and current, verification of Ohm's law. 2. Simple electrical circuit connectors, types of electrical current conducting wires. Making connections in simple electrical circuits, pins, plug, switches, fuses etc. 3. Concepts of making connections by soldering. 4. Introduction to the concept of Insulation, Grounding and Safety from Shock hazards. 5. Introduction to battery of cells, ac and dc power supply, potentiometer, ac Variac etc. 6. Introduction to Voltmeter, Ammeter, Ohmmeter. Usage of Voltmeter, Ammeter and Ohmmeter, Galvanometer and Multi-meter. 7. Introduction to different types of Resistors. Measurement of resistance using multi-meter. 	60	50



	<p>Reading the values of resistance from the colour codes.</p> <p>8. Introduction to different types of Capacitors and Inductors. Reading the values of from codes.</p> <p>9. Introduction to Transformer. Study of different types of Transformers.</p> <p>10. Introduction to LCR circuits. Series and Parallel configuration using Audio Frequency Oscillator.</p>		
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Reference Books:

1. **BASIC ELECTRONICS AND LINEAR CIRCUITS**
 - **N N BHARGVA, D C KULSHRESHTHA AND S C GUPTA, McGraw Hill Education (India) Private Limited.**
2. **PRINCIPLES OF ELECTRONICS**
 - **V K MEHTA AND ROHIT MEHTA, S CHAND PUBLICATION**
3. **BASIC ELECTRONICS**
 - **B. L. THERAJA,**
 - **S. CHAND PUBLICATION**