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PRESIDENCY UNIVERSITY

Private University Estd. in Karnataka State by Act No. 41 of 2013

SCHOOL OF ENGINEERING
DEPARTMENT OF PHYSICS

Ref. No. PU/SOE/PHY/BOS-02/2018-19/CIR01

Date: 7th April, 2019

2nd BOS Meeting Notice

The 2nd Board Of Studies (BOS) meeting of Department of Physics is scheduled on Saturday, 4th May 2019 at 11.00 AM in the Presidency University campus. You are hereby requested to attend the meeting.

Agenda:

PHY 2.1: Approval of 1st BoS MoM
PHY 2.2: Approval of ATR
PHY 2.3: Amendments in the Programme Academic Regulations
PHY 2.4: Review and approval of minor changes in Engineering Physics course
PHY 2.5: Approval of open elective courses for 4th year B.Tech. Students
PHY 2.6: Approval of Examiner List
PHY 2.7: Any other matter with the permission from the Chair

Chairperson
BOS-PHY Committee

Copy to:

- Pro-Chancellor, PU
- Registrar, PU
- Dean-SoE, PU
- Members of the BOS-PHY Committee:
- Vice-Chancellor, PU
- Pro-Vice-chancellor, PU
- Dean-Academics, PU

1	Dr. Khadke Udaykumar, Physics, PU	6	Mr. Pranay Nimje, Dept. of MEC, PU
2	Dr. U Mahaboob Pasha, Physics, PU	7	Dr. Ranjeth kumar Reddy, Physics, PU
3	Dr. P Mohankumar Naidu, Physics, PU	8	Dr. Murgendrappa M V., BMSE B'lore
4	Dr. Deepthi P R, Physics, PU	9	Dr. Avadhani D N., RVCE B'lore
5	Dr. Kishore Sanapala, Dept. of ECE, PU	10	Mr. Ramkrishna Reddy P, Sikarsystem, B'lore

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PRESIDENCY UNIVERSITY

Private University Estd. in Karnataka State by Act No. 41 of 2013

SCHOOL OF ENGINEERING
DEPARTMENT OF PHYSICS

Ref. No.: PU/SOE/PHY/BOS-02/2018-19/MOM-01 Date: 4th May, 2019

Minutes of the 2nd Meeting of Board of Studies (Physics – BOS – PHY)

The 2nd meeting of Board of Studies (BOS) of the Physics is held today on 4th May, 2019 at 11.00 AM in Room No. MG 12.

The following members are present:

S. No.	Name	Designation with Affiliation	Status
1	Dr. Khadke Udaykumar,	Assoc. Professor and HOD-PHY SOE, PU, Bengaluru	Chairperson
2	Dr. P Mohankumar Naidu,	Associate Professor-PHY SOE, PU, Bengaluru	Internal Member
3	Mr. Kishore	Assistant Professor-ECE SOE, PU, Bengaluru	Internal Member
4	Mr. Pranay Nimje,	Assistant Professor-MEC SOE, PU, Bengaluru	Internal Member
5	Dr. T. Ranjeth Kumar Reddy	Assistant Professor-PHY SOE, PU, Bengaluru	Member Secretary
6	Dr. Avadhani D N	Assoc. Professor RV College of Engineering Bengaluru	External Member (Academic)
7	Mr. Ramkrishna Reddy P,	Director, Sikarsystem, Bengaluru	External Member (Industry)

The following members are given leave of absence:

S. No.	Name	Affiliation	Position
1	Dr. U Mahaboob Pasha,	Associate Professor-PHY SOE, PU, Bengaluru	Internal Member
2	Dr. Deepthi P R,	Associate Professor-PHY SOE, PU, Bengaluru	Internal Member
3	Dr. Murgendrappa M V	Assoc. Professor and HOD BMS College of Engineering, Bengaluru	External Member (Academic)

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The Chairman welcomed the Members and called the meeting to order.

Agenda PHY 2.1: Approval of 1st BOS MOM

The minutes of the 1st meeting of the Board of Studies of Physics held on 12th January 2019 was placed before the members and the same was confirmed.

Agenda PHY 2.2: Action Taken Report.

The Action taken report on the previous minutes was presented by the Chairperson. The same was noted and taken on record.

Agenda PHY 2.3: Amendments in the Programme Academic Regulations

Chairperson presented the details of the academic regulations. Further the examination component has been discussed. After detailed deliberations, the academic regulations were approved.

Agenda PHY 2.4: Review and approval of minor changes in Engineering Physics course

The Chairperson presented the course description for Engineering Physics to the BOS which will be applicable for all batches from the 2019-20 batch. The course description is enclosed as Annexure PHY 2.4. The committee approved the proposed course description

Agenda PHY 2.5: Approval of open elective courses for 4th year B.Tech. Students

The Chairperson requested the BoS to permit the inclusion of the Open Elective Course 'Nano science and Nanotechnology' for 4th year B.Tech. Students. The details of this course is enclosed as Annexure PHY 2.5. BoS approved this Open Elective Course.

Agenda PHY 2.6: Approval of Examiner List

The Chairperson asked the BoS to approval of examiner list.

Agenda PHY 2.7: Any other matter with the permission from the Chair

The BOS Committee has authorized the BOS Chairperson, to incorporate minor corrections / edits, if required.
The BOS Chairperson has conveyed that the decisions taken during the 2nd BOS meeting of Physics Board will be implemented for 2019-2020.

The meeting concluded with vote of thanks by the Chair.

REGISTRAR

BOS Committee:

S. No.	Name	Position	Signature with date
1	Dr. Khadke Udaykumar,	Chairperson	04/05/19
2	Dr. U Mahaboob Pasha,	Internal Member	Absent
3	Dr. P Mohankumar Naidu,	Internal Member	04/05/19
4	Dr. Deepthi P R,	Internal Member	Absent
5	Dr. Kishore	Internal Member	4/5/19
6	Mr. Pranay Nimje,	Internal Member	4/5/19
7	Dr. T. Ranjeth Kumar Reddy	Member Secretary	04/05/19
8	Dr. Murgendrappa M V	External Member (Academic)	Absent
9	Dr. Avadhani D N	External Member (Academic)	4/5/19
10	Mr. Ramkrishna Reddy P,	External Member (Industry)	4/5/19

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PRESIDENCY UNIVERSITY

Private University Estd. in Karnataka State by Act No. 41 of 2013

SCHOOL OF ENGINEERING
DEPARTMENT OF PHYSICS

Ref. No. PU/SOE/PHY/BOS-02/2018-19/Attendance

Date: 4th May, 2019

ATTENDANCE SHEET

The 2nd meeting of Board of Studies (BOS) for Physics is held today on 4th May, 2019 in Presidency University, Bengaluru campus at 11.00 AM in the presence of following members of the BOS committee.

S. No.	Name	Designation with Affiliation	Status	Signature with date
1	Dr. Khadke Udaykumar,	Assoc. Professor and HOD-PHY SOE, PU, Bengaluru	Chairperson	4/5/19
2	Dr. U Mahaboob Pasha,	Associate Professor-PHY SOE, PU, Bengaluru	Internal Member	Absent
3	Dr. P Mohankumar Naidu,	Associate Professor-PHY SOE, PU, Bengaluru	Internal Member	4/5/19
4	Dr. Deepthi P R,	Associate Professor-PHY SOE, PU, Bengaluru	Internal Member	Absent
5	Mr. Kishore	Assistant Professor-ECE SOE, PU, Bengaluru	Internal Member	4/5/19
6	Mr. Pranay Nimje,	Assistant Professor-MEC SOE, PU, Bengaluru	Internal Member	4/5/19
7	Dr. T. Ranjeth Kumar Reddy	Assistant Professor-PHY SOE, PU, Bengaluru	Member Secretary	4/5/19
8	Dr. Murgendrappa M V	Assoc. Professor and HOD BMS College of Engineering, Bengaluru	External Member (Academic)	Absent
9	Dr. Avadhani D N	Assoc. Professor RV College of Engineering Bengaluru	External Member (Academic)	4/5/19
10	Mr. Ramkrishna Reddy P,	Director, Sikarsystem, Bengaluru	External Member (Industry)	4/5/19

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www.presidencyuniversity.in

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PRESIDENCY UNIVERSITY

Department of Physics, School of Engineering

COURSE HANDOUT

16 January, 2019

Course	: Engineering Physics
Course Code	: PHY 101
Semester	: II
Year	: 1st Year [2018-2019 Batch]
L-T-P-C Structure	: 4-0-0-4
Course Type	: Basic Course
Regulation Approved	: PU/AC-10/85/01-2019
Semester Starting Date	: 16-01-2019
Continuous Assessment 1: Test 1 Date	: 01-03-2019 to 06-03-2019
Continuous Assessment 1: Test 2 Date	: 13-04-2019 to 16-04-2019
Last Instruction Day	: 14-05-2019
End Term Examination Date	: 20-05-2019 to 08-06-2019
Total Number of Sessions Planned	: 60
Total Number of Tutorial Hours Planned	: 00
Total Number of Practical Hours Planned	: 00
Number of Lecture Hour for Course Introduction	: 01
Number of Lecture Hour for Content Delivery	: 44
Number of Lecture Hour for Course Integration	: 11
Number of Lecture Hour for Evaluation	: 04
Syllabus for Test 1	: L01-L18 (Course Outcome No. 02)
Syllabus for Test 2	: L22-L38, (Course Outcome No.3-4)
Syllabus for End Term Exam	: L01-L60, (Course Outcome No.1-4)
Continuous Assessment 3: Last Day for 1st Task Submission	: 25-02-2019
Continuous Assessment 3: Last Day for 2nd Task Submission	: 05-04-2019
Continuous Assessment 3: Last Day for 3rd Task Submission	: 22-04-2019
Continuous Assessment 3: Last Day for 4th Task Submission	: 30-04-2019
Instructor In-charge	: Dr. Mohankumar P Naidu

Instructor(s) : Dr Deepthi P R, Dr Mahaboob Pasha U, Dr Jagadeesha Angadi V, Dr Sivasankara Reddy N, Mr Prathul Nath P P, Dr Sreevidya Varma, Dr Khadke Udaykumar, Dr Vanitha M K, Ms Bini B Nair, Dr Ranjeth Kumar Reddy T, Mr Kumar Shivam, Dr Naveen C S, Dr Anindita Bhattacharya

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PRESIDENCY UNIVERSITY, BENGALURU

School of Engineering

PROGRAMME – B.Tech

II Semester 2018-19

Course Handout

Dated: *16th January 2019*

Course Code	: PHY 101
Course Name	: Engineering Physics
Credit Structure	: 4-0-0-4
Instructor-in-charge	: Dr Mohan Kumar Naidu P
Instructors	: Dr Deepthi P R, Dr Mahaboob Pasha U Dr Jagadeesha Angadi V, Dr Sivasankara Reddy N, Mr Prathul Nath P P Dr Sreevidya Varma, Dr Khadke Uday Kumar, Dr Vanitha M K, Ms Bini B Nair, Dr Ranjeth Kumar Reddy T, Mr Kumar Shivam, Dr Naveen C S, Dr Anindita Bhattacharya

Program Outcomes:

a) an ability to apply knowledge of mathematics, science, and engineering

b) an ability to design and conduct experiments, as well as to analyze and interpret data

c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

d) an ability to function on multidisciplinary teams

e) an ability to identify, formulate, and solve engineering problems

f) an understanding of professional and ethical responsibility

g) an ability to communicate effectively

h) an ability to understand the impact of engineering solutions in a global, economic, environmental, and societal context

i) An ability to recognize the need for, and an ability to engage in life-long learning

j) an ability to acquire the knowledge of contemporary issues

k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

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1. Course Objectives :

(i) The course aims at reinforcing the fundamentals aspects of Physics.

(ii) It enable students in applying fundamentals of physics in engineering situations.

(iii) To enable the students to understand the working and applications of lasers and optical fibers in day today life.

(iii) To understand the fundamentals of semiconductor devices and its applications.

(iv) To understand the basics of dielectric, magnetic and semiconductor materials.

(v) To understand quantum mechanics and its applications.

2. Course outcome(s):

On successful completion of the course the students shall be able to:

(i) Explain the concepts of quantum mechanics
(ii) Apply the principles of laser and optical fibers in communication
(iii) Explain the electrical properties of the materials
(iv) Describe the concepts of magnetic, dielectric and super conducting materials and their applications

3. CO's Mapping with PO's:

CO \ PO	a	b	C	d	e	f	g	h	i	j	k
i	✓				✓				✓		
ii	✓	✓		✓	✓				✓		
iii	✓			✓					✓		
iv	✓			✓					✓		

4. Course Description :

The main objective of this course is to study the basic concepts of physics which develop the ability to identify, formulate and apply to engineering applications. This course covers the areas, namely, applied physics, solid state physics and modern physics.

The course includes the concepts of lasers and its applications in the field of optical fibers communication system and other areas. The properties and applications of contemporary and useful materials such as semiconductors, superconductors and dielectric materials are discussed in detailed manner.

It also emphasises on modern concepts such as free electron theory, electrical properties of metals, Fermi energy and importance of Fermi factor. Finally, the quantum approach concepts like, matter waves, Heisenberg's uncertainty principle, Schrodinger's time independent equation and application of Schrodinger's wave equation are discussed.

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5. Syllabus :

Quantum Mechanics: Matter waves and properties, phase velocity, group velocity and relation between them. Relation between group velocity and particle velocity. Heisenberg's uncertainty principle, Schrodinger's time independent equation, application of Schrodinger's wave equation: Particle in a box. Numerical problems.

Laser: Principle of laser, Einstein coefficients, condition and requisites of laser, CO_2 laser: Principle, construction and working - Applications of CO_2 laser. Semiconductor laser: Principle, construction and working - Applications of semiconductor lasers. Numerical problems.

Optical fibers - Structure, Principle, Acceptance angle and Numerical Aperture, Types of optical fibers- SMF, MMF and GRIN. Losses in optical fibers. Applications - fiber optic communication system, fiber optic sensors-medical endoscope.

Electrical Properties: Postulates of quantum free electron theory, Fermi factor, Merits of QFE Density of state (Qualitative), Fermi energy.
Superconductivity- Properties, Meissner effect, BCS theory, types of superconductors – Applications - MAGLEV.

Material Science:

Dielectric materials: Types of polarization in dielectrics (qualitative), frequency and temperature dependence of polarization, Internal field (qualitative), Clausius-Mossotti equation, ferroelectricity, piezo electricity.

Magnetic materials: Classification of magnetic materials, hysteresis of ferromagnetic, hard and soft magnetic materials.

Semiconductors: Band theory of solids, Solar cells - Working and efficiency of Solar cells, its applications: Industrial and social.

6. Instructional Pedagogy :

The course consists of a four-hour lecture per week. Since it is multisection course uniformity should be maintained in delivering the lecture and common PPT's are planned for multisections. It is instructor responsibility to cover the portion in time. Lectures will be conducted with the aid of multi-media projector, blackboard, etc. Assignments will be given periodically to assess the students.

7. Books :

(i) Textbook(s)

T1. Wiley, "Engineering Physics", Wiley India.

Reference Book(s)

R1. G Aruldhas, "Engineering Physics",PHI Learning Pvt. Ltd, Delhi.

R2. M.N Avadhanulu, P G Kshirsagar, "Engineering Physics", S Chand & Company Pvt. Ltd.

REGISTRAR

R3. Md. N. Khan, S Panigrahi, "Principles of Engineering Physics 1 & 2", Cambridge University Press.

R4. Serway Raymond and Jewett John, *"Physics for Scientists and Engineers with Modern Physics"*, Cengage.

8. Session Plan :

Session No.	Learning Objectives	Topics to be covered	Reference
1.	Understanding the importance of Engineering Physics	Importance of Physics in Engineering	--
2.	Explain the characteristics laser	Introduction, Characteristics of laser	T1(8)
3.	Explain the principle of laser	Absorption, spontaneous emission, stimulated emission,	T1(8)
4.	Derive Einstein coefficients	Einstein coefficient's	T1(8)
5.	Explain the condition and requisites for laser	Condition for laser action, Laser system	T1(8)
6.	Explain the construction and working of CO_2 laser	Construction and working of CO_2 Laser with energy level diagrams	T1(8)
7.	Calculate wavelength, the ratio of population, Temperature	Problems on Lasers	T1(8)
8.	Calculate ratio of spontaneous and stimulated emission	Problems on Lasers	T1(8)
9.	Explain the construction and working of semiconductor laser	Construction and working of Semiconductor laser with energy level diagram	T1(8)
10.	**Assessment**	**Practice test on Lasers**	*
11.	Explain the principle of optical fibers	Principle of propagation of light waves in optical fibers, Advantages of optical fiber communications	T1(8)
12.	Derive Acceptance angle and Numerical aperture	Acceptance angle and Numerical aperture	T1(8)
13.	Calculate Acceptance angle and Numerical aperture	Problems on Acceptance angle and Numerical aperture	T1(8)
14.	Differentiate Types of optical fibers	Types of optical fibers-SMF, MMF and GRIN	T1(8)
15.	Use optical fibers in communication system	Fiber optic communication system	T1(8)
16.	**Use optical fibers in sensors and medical field**	**Fiber optic sensors-medical endoscope**	*
17.	Discuss the losses in optical fibers	Losses in optical fibers-Dispersion, Scattering and Radiation	T1(8)

REGISTRAR

Session No.	Learning Objectives	Topics to be covered	Reference
18.	Calculate Numerical aperture, acceptance angle, fractional index change and attenuation	Problems on modes of propagation	T1(8)
19.	**Assessment**	**Practice test on optical fibers**	*
20.	**Revision class on Laser and Optical fibers**	**Revision on Laser and Optical fibers**	*
21.		**Assessment –Test 1**	*
22.	Explain postulates of quantum free electron theory, Its merits	Quantum free electron theory-QFE	T1(14)
23.	Explain Fermi factor and its importance	Fermi factor, Merits of QFE and its importance	T1(14)
24.	Define Density of state and fermi energy	Density of state (Qualitative), Fermi energy	T1(14)
25.	Calculate Fermi factor and Fermi energy	Problems on Fermi factor and Fermi energy	T1(14)
26.	Explain the superconducting phenomena	Temperature dependence of resistance and super conducting phenomena	T1(6)
27.	Explain BCS theory	Meissner effect, BCS theory	T1(6)
28.	Differentiate Type-I and Type-II superconductors	Types of superconductors, Applications of super conductors- **MAGLEV**	**T1(6)***
29.	**Assessment**	**Practice test on electrical properties of metals**	*
30.	Explain the types of polarization	Dielectric materials and dielectric constant, types of polarization in dielectrics (Qualitative)	T1(5)
31.	Explain the frequency and temperature dependence of polarization	Frequency and temperature dependence of polarization	T1(5)
32.	Derive Clausius-Mossotti equation	Internal field (qualitative) , Clausius-Mossotti equation	T1(5)
33.	Calculate relative permittivity, polarization and electronic polarizability	Problems on dielectric materials	T1(5)
34.	Define magnetic parameters	Magnetic materials and Magnetic parameters	T1(4)
35.	Differentiate magnetic materials	Classification- Dia,Para and Ferro	T1(4)
36.	Explain Hysteresis for ferromagnetic materials	Hysteresis curve for ferromagnetic materials	T1(4)
37.	Differentiate soft and hard magnetic materials	Soft and hard magnetic materials	T1(4)
38.	Calculate magnetic susceptibility and relative	Problems on magnetic materials	T1(4)

Session No.	Learning Objectives	Topics to be covered	Reference
	permeability		
39.	**Assessment**	**Practice test on Material Science**	*
40.	**Revision class on Electrical conductivity and Material science**	**Revision on Electrical conductivity and Material science**	*
41.		**Assessment- Test 2**	*
42.	Differentiate intrinsic and extrinsic semiconductors	Classification of semiconductors-	T1(7)
43.	Differentiate intrinsic and extrinsic semiconductors	intrinsic and extrinsic semiconductors	T1(7)
44.	Calculate the efficiency of solar cell	Working and efficiency of Solar cells, its applications	T1(7)
45.	Calculate energy band gap of semiconductors	Problems on band theory of solids	T1(7)
46.	**Assessment**	**Quiz**	*
47.	**Assessment**	**Practice test on semiconductors**	*
48.	Explain the concept of de Broglie wavelength	de Broglie wavelength associated with electron, properties of matter waves	T1(13)
49.	Define Phase and Group velocity	Phase and Group velocity	T1(13)
50.	Derive the relation between V_p and V_G	Relation between V_p and V_G	T1(13)
51.	Derive the relation between particle velocity and group velocity	Relation between group velocity and particle velocity	T1(13)
52.	Calculate the de Broglie wavelength, V_p and V_G	Problems on matter waves	T1(13)
53.	Define uncertainty principle	Heisenberg's Uncertainty principle	T1(13)
54.	**Assessment**	**Seminar**	*
55.	Calculate the Uncertainty in position, momentum and energy	Problems on Uncertainty principle	T1(13)
56.	Derive Schrodinger's time independent one dimensional wave equation	Schrodinger's time independent wave equation in one dimension.	T1(13)
57.	Apply Schrodinger's time independent wave equation to a particle inside a potential well	Particle inside a potential well	T1(13)
58.	Calculate Energy of a particle in an infinite potential well	Problems on Schrodinger's time independent wave equation	T1(13)
59.	**Assessment**	**Practice test on quantum mechanics**	*
60.	**Revision class on Band**	**Revision on Band theory and quantum**	*

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Session No.	Learning Objectives	Topics to be covered	Reference
	theory and quantum mechanics	mechanics	

Note: Contact hours- 45; Practice test/ Revision/Seminar/Quiz/Assesment-15

9. Self learning topics :

Sl. No.	Self Study Topic	Source
1	Types of semiconductor lasers-Hetero and Homo junction	T1(8)
2	Applications of lasers	T1(8)
3	Applications of superconductors –MAGLEV, SQUID	T1(6)
4	Classification of solids based on band theory	T1(7)
5	Conditions for Interference, Types of interference	R1(2)

10.Assesments:

Component	Duration (minutes)	% Weightage	Marks	Date	*Venue
Test 1	60	20	40	1st March 2019 to 6th March 2019	
Test 2	60	20	40	13th April 2019 to 16th April 2019	
Assignment-1 Assignment-2 Quiz Other assessment/ seminar	-	5 5 5 5	40	18th February 2019 1st April 2019 22nd April 2019 to 26th April 2019	
Last Instruction Day				**14/05/19**	
End term final exam	180	40	80	20th May 2019 to 08th June 2019	

* Details will be disclosed later.

11. Chamber consultation hour : Will be announced in class.

12. Notices : All course related notices will be displayed on the **Department notice board only**.

Note :

Portions of the course are analytical and problems will be solved during contact hours. Scientific calculator is essential for the course.

Instructor-in-charge

REGISTRAR

ANNEXURE PHY 2.6

Proposed list of external examiners for BOE Panel (Physics Board)

Sl. No.	Name of the Faculty and Address	Email ID	Phone No.	Institute Status
01	Dr. J. Thippe Rudrappa Professor & Head Dept. of Physics, B.N.M. Institute of Technology, Bangalore, India,	jthipperudrappa@bnmit.in, jtrphy2007@gmail.com	9845887317	Autonomous
02	Dr. H M Suresh Professor and Head Department of Physics, Siddaganga Institute of Technology, Tumkur-103, Karnataka	sureshkumarhm@rediffmail.com	9341243791 / 9483692842 0816-2214065 (O)	Autonomous
03	Dr Kiran K S Professor and Head Jain University School of Engineering and Technology, JGI Global Campus, Jakkasandra Post, Kanakapura Ramnagar, Bangalore- 562112	kiranxrd@gmail.com	9448419437	Jain University
04	Dr. C S Prakash Professor SJCIT, Chickaballapur	cspavani@gmail.com drcsp7868@gmail.com	9980169840	Affiliated to VTU
05	Nitte Minakshi			
06	VIT			

REGISTRAR

DETAILS OF INTERNAL EXAMINERS

Sl. No.	Faculty Name	Designation
1	Dr. Udaykumar Khadke	Associate Professor-HoD
2	Dr. U Mahaboob Pasha	Associate Professor
3	Dr. Mohan Kumar Naidu	Associate Professor
4	Dr. Deepthi P R	Associate Professor
5	Dr. Sivasankar Reddy	Assistant Professor
6	Dr. Jagadeesha V Angadi	Assistant Professor
7	Mr. Prathul Nath P P	Assistant Professor
8	Dr. Sreevidya Varma	Assistant Professor
9	Dr. Vanitha M K	Assistant Professor
10	Dr. T Ranjeth K Reddy	Assistant Professor
11	Mr. Kumar Shivam	Assistant Professor
12	Ms. Bini B Nair	Assistant Professor
13	Dr. Naveen C S	Assistant Professor
14	Dr. Anindita Bhattacharya	Assistant Professor

REGISTRAR

SCHOOL OF ENGINEERING
DEPARTMENT OF PHYSICS

Date: 17th Jan, 2020

Minutes of the 3rd Meeting of Board of Studies (Physics – BOS – PHY)

The 3rd meeting of Board of Studies (BOS) of the Physics is held today, 17th Jan, 2020 at 11.00 AM at Room No. MG 12.

The following members are present:

S. No.	Name	Designation with Affiliation	Status
1	Dr. P Mohan Kumar Naidu	Assoc. Professor and HOD-PHY SOE, PU, Bengaluru	Chairperson
2	Dr. U Mahaboob Pasha	Associate Professor-PHY SOE, PU, Bengaluru	Internal Member
3	Dr. Deepthi P R	Associate Professor-PHY SOE, PU, Bengaluru	Internal Member
4	Dr. T. Ranjeth Kumar Reddy	Assistant Professor-PHY SOE, PU, Bengaluru	Member Secretary
5	Dr. Murgendrappa M V	Assoc. Professor and HOD BMS College of Engineering, Bengaluru	External Member (Academic)

The following members are given leave of absence:

S. No.	Name	Affiliation	Position
1	Dr. Avadhani D N	Assoc. Professor RV College of Engineering Bengaluru	External Member (Academic)
2	Mr. Ramkrishna Reddy P	Director, Sikarsystem, Bengaluru	External Member (Industry)
3	Mr. Pranay Nimje	Assistant Professor-MEC SOE, PU, Bengaluru	Internal Member

REGISTRAR
PRESIDENCY UNIVERSITY Registrar BANGALORE

The Chairperson welcomed the Members and called the meeting to discuss the followings.

Agenda I: Approval of the minutes of the 2nd Board of Studies meeting held on 4th May 2019

The minutes of the 2nd meeting of the Board of Studies (Physics) held on 4th May 2019 was placed before the members and the same was confirmed.

Agenda II : Review and approval of modifications in the B.Tech. Program Regulations and Curriculum for the existing 2019-2020 batch

Chairperson presented the details course description of Engineering Physics and Engineering Physics Lab to the BOS members that will be applicable for all batches (2019-20). The course descriptions are enclosed as Annexure II. The committee approved the proposed course description.

Agenda III. Discussion on feedback on curriculum from stakeholders

The feedback was collected from different stakeholders such as faculty, students, alumni and employers and it was analyzed. The necessary actions were taken.

Agenda IV.Approval of updated list of Examiners for various courses in all the programs of the School of Engineering

The Chairperson presented the list of External and Internal examiner members to be included as BOE. The BoS has approved the members of BOE and enclosed in Annexure IV.

Agenda IV.Any other matter with the permission of the Chair.

The BOS Committee has authorized the BOS Chairperson, to incorporate minor corrections / edits, if required.

The BOS Chairperson has conveyed that the decisions taken during the 3rd BOS meeting of Physics Board will be implemented for 2019-2020.

The meeting concluded with vote of thanks by the Chair.

REGISTRAR
PRESIDENCY UNIVERSITY Registrar BANGALORE

BOS Committee:

S. No.	Name	Position	Signature with date
1	Dr. P Mohan Kumar Naidu,	Chairperson	
2	Dr. U Mahaboob Pasha,	Internal Member	
3	Dr. Deepthi P R,	Internal Member	
4	Mr. Pranay Nimje,	Internal Member	
5	Dr. T. Ranjeth Kumar Reddy	Member Secretary	
6	Dr. Murgendrappa M V	External Member (Academic)	
7	Dr. Avadhani D N	External Member (Academic)	
8	Mr. Ramkrishna Reddy P,	External Member (Industry)	

REGISTRAR
PRESIDENCY UNIVERSITY Registrar BANGALORE

ANNEXURE II

Course Name:	ENGINEERING PHYSICS						Type of Skill	Course Address to
Course Code:	PHY 101	Credit Structure :	L	T	P	C		
			4	0	0	4		

COURSE OUTCOMES: On successful completion of the course the students shall be able to:

CO1: Compare conductors, semiconductors, dielectric and superconducting materials.

CO2: Apply the knowledge of laser and optical fibers in various applications.

CO3 Describe the concepts of modern physics and quantum mechanics.

COURSE DESCRIPTION:

The main objective of this course is to study the basic concepts of physics that helps developing the ability to identify, formulate and apply to engineering applications. This course covers the areas, namely, applied physics and modern physics. The course includes the concepts of free electron theory, electrical properties and applications of contemporary and useful materials such as semiconductors, superconductors and dielectric materials are discussed in detailed manner.
It also emphasizes on modern concepts such as the concepts of lasers and its applications in the field of optical fiber communication system and other areas. Finally, the need of quantum mechanics, the quantum approach concepts like, matter waves, Heisenberg's uncertainty principle, Schrodinger's time independent equation and application of Schrodinger's wave equation are discussed.

COURSE CONTENT (SYLLABUS):

Module:1: Electrical Properties: Failures of classical free electron theory (CFT), postulates of quantum free electron theory (QFT), merits of QFT, Fermi energy**.**

Semiconductors: Fundamentals and types of semiconductors, pn junction formation, solar cells - working and efficiency of solar cells.

Dielectric materials: Introduction, types of polarization in dielectrics (qualitative), frequency and temperature dependence of polarization.

Superconductivity: Introduction, Meissner effect, BCS theory, critical field, types of superconductors**.**

[12 Hrs] [Blooms level selected: Comprehension]

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Module: 2: Laser: Principle of laser, Einstein coefficients, condition and requisites of laser, CO_2 laser: Principle, construction and working - applications of CO_2 laser. Semiconductor laser: Principle, construction and working - applications of semiconductor lasers, Industrial applications of LASER, Numericals.

[9 Hrs] [Blooms level selected: Apply]

Module: 3: Optical fibers: Structure, principle, acceptance angle and Numerical Aperture, types of optical fibers- modes of propagation: single mode and multi-mode, refractive index profile: step index, graded index, losses in optical fibers. Applications - fiber optic communication system, Medical Endoscope, Numericals.

[8 Hrs] [Blooms level selected: Apply]

Module: 4 Modern Physics: Need and Origin of quantum concept, Planck's theory (Qualitative). Matter waves and properties, phase velocity, group velocity and relation between them. Relation between group velocity and particle velocity. Numericals.

[9 Hrs] [Blooms level selected: Comprehension]

Module: 5 Quantum Mechanics: Heisenberg's uncertainty principle, wave function, physical significance of wave function, Schrodinger's time independent equation, application of Schrodinger's wave equation: Particle in a box.

[5 Hrs] [Blooms level selected: Comprehension]

Textbook(s)

T1. Wiley, *Engineering Physics*, 2014 Wiley India.

Reference Book(s)

R1. G Aruldhas, *Engineering Physics*,2014 PHI Learning Pvt. Ltd, Delhi.
R2. M.N Avadhanulu, P G Kshirsagar, *Engineering Physics*, 2010 S Chand & Co. Pvt. Ltd.
R3. Md. N. Khan, S Panigrahi, *Principles of Engineering Physics* 1 & 2, 2014 Cambridge Univ. Press.
R4. Serway Raymond and Jewett John, *Physics for Scientists and Engineers with Modern Physics*, 2003 Cengage.
R5: Arthur and Beiser Concepts of Modern physics 2017 7th Edition McGraw Hill Education

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Course Name:	ENGINEERING PHYSICS LAB						Type of Skill	Course addresses to
Course Code:	PHY 151	Credit Structure :	L	T	P	C		
			0	0	2	1		

Course Learning Objectives

The objective of the course is to give hands on experience to the students on the fundamental principles learnt in Engineering Physics course.

COURSE OUTCOMES:

After the completion of the course students shall be able to:

CO1: Record the data with precision using different measuring devices.
CO2: Convert the measured data into appropriate quantitative results.
CO3: Interpret and analyze the calculated results.
CO4: Develop basic communication skills through working in groups in performing the laboratory experiments.

COURSE DESCRIPTION:

This course includes the laboratory sessions on determination of the wave length of Laser, rigidity modulus, Planck's constant, dielectric constant, radius of curvature by Newton's rings, calculation of Numerical Aperture, energy band gap by Four probe method, Fermi energy of copper and acceleration due to gravity by simple pendulum. It also includes experiments on characteristics of Zener diode.

List of Practical

Lab No.	Learning Objective
1.	Determine the wavelength of the given semiconductor diode LASER
2.	Determine the value of Planck's Constant using LED's
3.	Determine the dielectric constant of the material used in the given capacitor by charging and discharging the capacitor
4.	Determine the moment of inertia of the disc and rigidity modulus of the material of the given wire
5.	Determine the radius of curvature of the given plano-convex lens, by Newton's rings

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6.	Determine the Fermi energy and Fermi temperature of the given metal by studying the variation of resistance of wire of the material with temperature.
7.	Determine the knee voltage, breakdown voltage and forward resistance of the zener diode
8.	Determine the Numerical aperture of a given optical fiber using laser
9.	Determine the resistivity of semiconductor sample using four probe.
10.	Determine the acceleration due to gravity using a simple pendulum

Reference

"Engineering Physics Lab Manual", Presidency University (2019-20)

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ANNEXURE IV

Proposed list of external examiners for BOE Panel (Physics Board)

Sl. No.	Name of the Faculty and Address	Email ID	Phone No.	Institute Status
01	Dr. Suresh Kumar M. R Associate Professor and HOD Department of Physics RV Institute of Technology and Management. Kothanur, 8th Phase, JP Nagar, Bengaluru-560076.	sureshkumarmr.rvitm@rvei.edu.in	9886431547	Autonomous
02	Dr Shilpashree S P Assistant Professor Department of Physics Christ University Mysore Road, Kanmanike, Kumbalgodu, Bangalore - 560 060	shilpashreesp@gmail.com	9620958922	Christ University
03	Dr Kiran K S Professor and Head Jain University SOE & T, JGI Global Campus, Jakkasandra Post, Kanakapura Ramnagar, Bangalore-12	kiranxrd@gmail.com	9448419437	Jain University
04	Dr. Doreswamy B H Professor and HOD #67, BGS Health & Education City, Dr. Vishnuvardhan Road, Kengeri, Bengaluru – 560060. KARNATAKA, INDIA.		9449318776	SJB Institute of Technology
05	Dr H M Suresh Professor and Head Department of Physics SIT, Tumkur-103 Karnataka	sureshkumarhm@rediffmail.com	9341243791	Autonomous

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DETAILS OF INTERNAL EXAMINERS

Sl. No.	Faculty Name	Designation
1	Dr. Mohan Kumar Naidu	Associate Professor-HoD
2	Dr. U Mahaboob Pasha	Associate Professor
3	Dr. Deepthi P R	Associate Professor
4	Dr. Sivasankar Reddy	Assistant Professor
5	Dr. Sreevidya Varma	Assistant Professor
6	Dr. T Ranjeth K Reddy	Assistant Professor
7	Ms. Bini B Nair	Assistant Professor
8	Dr. Naveen C S	Assistant Professor
9	Dr. Anindita Bhattacharya	Assistant Professor
10	Dr. Harish Sharma A	Assistant Professor
11	Dr. Pradeep Bhaskar	Assistant Professor
12	Dr. Brian Jeevan Fernadez	Assistant Professor

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SCHOOL OF ENGINEERING
DEPARTMENT OF PHYSICS

Date: 28th Aug, 2020

Minutes of the 4th Meeting of Board of Studies (Physics – BOS – PHY)

The 4th meeting of Board of Studies (BOS) of the Physics is held today, 28th August, 2020 at 10.30 AM.

The following members are present:

S No	Name	Affiliation	Position
1.	Dr. P Mohan Kumar Naidu	Associate Professor-HOD - PHY	Chairperson
2.	Dr. Deepthi P R	Associate Professor - PHY	Member
3.	Dr. U Mahaboob Pasha	Associate Professor - PHY	Member
4.	Dr. Sivasankara Reddy	Assistant Professor - PHY	Member
5.	Dr Sreevidya Varma	Assistant Professor - PHY	Member
6.	Dr. T Ranjeth Kumar Reddy	Assistant Professor - PHY	Member
7.	Mr. V V S Vijaya Krishna	Assistant Professor - ECE	Member
8.	Dr. Sadanand Sarapure	Assistant Professor - MEC	Member
9.	Dr. K Ramesh	Principal Research Scientist, Department of Physics, IISc, Bengaluru	External Member (Academic)
10.	Dr. Kiran K S	Professor and Head, Department of Physics, Jain University, Bengaluru	External Member (Academic)
11.	Mr. Sharath kumar Bollaje	Senior Hardware Engineer, Robert Bosch Engineering and Business Solutions PVT Ltd, Bengaluru	External Member (Industry)
12.	Dr Anindita Bhattacharya	Assistant Professor - PHY	Member Secretary

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The Chairperson welcomed the Members and called the meeting to discuss the followings.

Agenda 4.1 : Approval of the minutes of the 3rd Board of Studies meeting held on 17th Jan 2020

The minutes of the 3rd meeting of the Board of Studies (Physics) held on 17th Jan 2020 was placed before the members and the same was approved.

Agenda 4.2 : Review and approval of Physics Course Content for all the Engineering Programs of 2020 batch as in Annexure 1

Chairperson presented the course description of Engineering Physics (PHY 101) and Engineering Physics Lab (PHY 151) to the BOS members that will be applicable for all batches of AY 2020-21. The course descriptions are enclosed as Annexure II. The committee approved the proposed course description with minor changes.

- The committee suggested inclusion of Davisson Germer experiment and application of Heisenberg's uncertainty principle (non-existence of electron in nucleus) for the course PHY 101.
- It is also suggested to include the topic on magnetic materials in future.

The committee approved the syllabus for Engineering Physics lab (PHY 151) and it is suggested to consider Hall Effect experiments in future.

The committee approved the course description of General Physics (PHY 204) for UTA program.

Annexure I – List of Programs
Annexure II – Course Details

Agenda 4.3. Approval of updated list of Examiners for various courses in all the programs of the School of Engineering

The Chairperson presented the list of External and Internal examiner members to be included as BOE. The BOS has approved the members of BOE and enclosed in **Annexure III**.

Agenda 4.4. Any other matter with the permission of the Chair.

The BOS Committee has authorized the BOS Chairperson, to incorporate minor corrections / edits, if required.

The proposed value added course titles are approved by the committee and it is given in **Annexure IV**

Based on present situation, virtual mode of teaching is recommended and approved by the committee.

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The BOS Chairperson has conveyed that the decisions taken during the 4th BOS meeting of Physics will be implemented for AY 2020-21.

The meeting concluded with vote of thanks by the Chair.

BOS Committee:

S No	Name	Position	Signature with date
1.	Dr. P Mohan Kumar Naidu	Chairperson	
2.	Dr. Deepthi P R	Member	
3.	Dr. U Mahaboob Pasha	Member	
4.	Dr. Sivasankara Reddy	Member	
5.	Dr Sreevidya Varma	Member	
6.	Dr. T Ranjeth Kumar Reddy	Member	
7.	Dr Anindita Bhattacharya	Member Secretary	
8.	Mr. V V S Vijaya Krishna	Internal Member	
9.	Dr. Sadanand Sarapure	Internal Member	
10.	Dr. K Ramesh	External Member (Academic)	
11.	Dr. Kiran K S	External Member (Academic)	
12.	Mr. Sharath kumar Bollaje	External Member (Industry)	

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Annexure I

List of Programs:

Table 2.1

B. Tech. Degree Programs and Respective Parent Departments

S. No.	*B. Tech. Program (Branch/Discipline)*	*Parent Department*
1.	B. Tech. (Civil Engineering)	Department of Civil Engineering
2.	1. Computer Science and Engineering (Cyber Security) 2. Computer Science and Engineering (Artificial Intelligence and Machine Learning) 3. Computer Science and Engineering (IOT) 4. Computer Science and Engineering (Block Chain) 5. Computer Science and Engineering (Data Science) 6. Computer Science and Technology (Big Data) 7. Computer Science and Technology 8. Computer Science and Engineering 9. Information Science and Engineering 10. Information Science and Technology 11. Computer Engineering 12. Electronics and Computer Engineering 13. Computer and Communication Engineering	
14.	B. Tech. (Electronics and Communication Engineering)	Department of Electronics and Communication Engineering
15.	B. Tech. (Electrical and Electronics Engineering)	Department of Electrical and Electronics Engineering

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16.	B. Tech. (Mechanical Engineering)	Department of Mechanical Engineering
17.	B. Tech. (Petroleum Engineering)	Department of Petroleum Engineering

These Program Regulations shall be applicable to the following ongoing **Bachelor of Technology (B.Tech) Degree Programs of 2019-2023:**

1.3.1 Bachelor of Technology in Civil Engineering, abbreviated as B. Tech. (Civil Engineering);

1.3.2 Bachelor of Technology in Computer Science and Engineering (Cyber Security) abbreviated as B. Tech (CSE-Cyber Security)

1.3.3 Bachelor of Technology in Computer Science and Engineering (Artificial Intelligence and Machine Learning), abbreviated as B. Tech (CSE-AI & ML)

1.3.4 Bachelor of Technology in Computer Science and Engineering (IOT), abbreviated as B. Tech (CSE-IOT)

1.3.5 Bachelor of Technology in Computer Science and Engineering (Block Chain), abbreviated as B. Tech (CSE-Block Chain).

1.3.6 Bachelor of Technology in Computer Science and Engineering (Data Science), abbreviated as B. Tech (CSE-Data Science)

1.3.7 Bachelor of Technology in Computer Science and Technology (Big Data), abbreviated as B. Tech. (CSE-Big Data).

1.3.8 Bachelor of Technology in Computer Science and Technology, abbreviated as B. Tech CST

1.3.9 Bachelor of Technology in Computer Science and Engineering, abbreviated as B. Tech CSE

1.3.10 Bachelor of Technology in Information Science and Engineering, abbreviated as B. Tech ISE

1.3.11 Bachelor of Technology in Information Science and Technology, abbreviated as B. Tech IST

1.3.12 Bachelor of Technology in Computer Engineering, abbreviated as B. Tech CE

1.3.13 Bachelor of Technology in Computer and Communication Engineering, abbreviated as B. Tech CCE

1.3.14 Bachelor of Technology in Electronics and Computer Engineering, abbreviated as B. Tech ECOM

1.3.15 Bachelor of Technology in Electronics and Communication Engineering, abbreviated as B. Tech. (Electronics and Communication Engineering)

1.3.16 Bachelor of Technology in Electrical and Electronics Engineering, abbreviated as B. Tech. (Electrical and Electronics Engineering);

1.3.17 Bachelor of Technology in Mechanical Engineering, abbreviated as B. Tech. (Mechanical Engineering); and

1.3.18 Bachelor of Technology in Petroleum Engineering, abbreviated as B. Tech. (Petroleum Engineering).

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ANNEXURE II

Course Details:

Course Name:	ENGINEERING PHYSICS						Type of Skill	Course Address to
Course Code:	PHY 101	Credit Structure :	L	T	P	C		
			4	0	0	4		

COURSE OUTCOMES: On successful completion of the course the students shall be able to:

CO1: Compare conductors, semiconductors, dielectric and superconducting materials.

CO2: Apply the knowledge of laser and optical fibers in various applications.

CO3 Describe the concepts of modern physics and quantum mechanics.

COURSE DESCRIPTION:

The main objective of this course is to study the basic concepts of Physics that helps developing the ability to identify, formulate and apply to engineering applications. This course covers the areas, namely, applied physics and modern physics. The course includes the concepts of free electron theory, electrical properties and applications of contemporary and useful materials such as semiconductors, superconductors and dielectric materials are discussed in detailed manner.
It also emphasizes on modern concepts such as the concepts of lasers and its applications in the field of optical fiber communication system and other areas. Finally, the need of quantum mechanics, the quantum approach concepts like, matter waves, Heisenberg's uncertainty principle, Schrodinger's time independent equation and application of Schrodinger's wave equation are discussed.

COURSE CONTENT (SYLLABUS):

Module 1: Electrical Properties: Failures of classical free electron theory (CFT), postulates of quantum free electron theory (QFT), merits of QFT, Fermi energy**.**

Semiconductors: Fundamentals and types of semiconductors, pn junction formation, solar cells - working and efficiency of solar cells.

Dielectric materials: Introduction, types of polarization in dielectrics (qualitative), frequency and temperature dependence of polarization.

Superconductivity: Introduction, Meissner effect, BCS theory, critical field, types of superconductors**.**

[12 Hrs] [Blooms level selected: Comprehension]

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Module 2: Laser: Principle of laser, Einstein coefficients, condition and requisites of laser, CO_2 laser: Principle, construction and working - applications of CO_2 laser. Semiconductor laser: Principle, construction and working - applications of semiconductor lasers, Industrial applications of LASER, Numericals.

[9 Hrs] [Blooms level selected: Application]

Module 3: Optical fibers: Structure, principle, acceptance angle and Numerical Aperture, types of optical fibers- modes of propagation: single mode and multi-mode, refractive index profile: step index, graded index, losses in optical fibers. Applications - fiber optic communication system, Medical Endoscope, Numericals.

[8 Hrs] [Blooms level selected: Application]

Module 4 Modern Physics: Need and Origin of quantum concept, Davison and Germer's experiment, Planck's theory (Qualitative). Matter waves and properties, phase velocity, group velocity and relation between them. Relation between group velocity and particle velocity. Numericals.

[6 Hrs] [Blooms level selected: Comprehension]

Module 5 Quantum Mechanics: Heisenberg's uncertainty principle-application wave function, physical significance of wave function, Schrodinger's time independent equation, application of Schrodinger's wave equation: Particle in a box.

[5 Hrs] [Blooms level selected: Comprehension]

Textbook(s)

T1. Wiley, *Engineering Physics*, 2014 Wiley India.

Reference Book(s)

R1. G Aruldhas, *Engineering Physics*,2014 PHI Learning Pvt. Ltd, Delhi.
R2. M.N Avadhanulu, P G Kshirsagar, *Engineering Physics*, 2010 S Chand & Co. Pvt. Ltd.
R3. Md. N. Khan, S Panigrahi, *Principles of Engineering Physics* 1 & 2, 2014 Cambridge Univ. Press.
R4. Serway Raymond and Jewett John, *Physics for Scientists and Engineers with Modern Physics*, 2003 Cengage.
R5: Arthur and Beiser Concepts of Modern physics 2017 7th Edition McGraw Hill Education

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Course Name:	ENGINEERING PHYSICS LAB						Type of Skill	Course addresses to
Course Code:	PHY 151	Credit Structure :	L	T	P	C		
			0	0	2	1		

Course Learning Objectives

The objective of the course is to give hands on experience to the students on the fundamental principles learnt in Engineering Physics course.

COURSE OUTCOMES:

After the completion of the course students shall be able to:

CO1: Record the data with precision using different measuring devices.
CO2: Convert the measured data into appropriate quantitative results.
CO3: Interpret and analyze the calculated results.
CO4: Develop basic communication skills through working in groups in performing the laboratory experiments.

COURSE DESCRIPTION:

This course includes the laboratory sessions on determination of the wave length of Laser, rigidity modulus, Planck's constant, dielectric constant, radius of curvature by Newton's rings, calculation of Numerical Aperture, Resistivity by four probe method, Fermi energy of copper and acceleration due to gravity by simple pendulum. It also includes experiments on characteristics of Zener diode.

List of Experiments:

Lab No.	Learning Objective
1.	Determine the wavelength of the given semiconductor diode LASER
2.	Determine the value of Planck's Constant using LED's
3.	Determine the dielectric constant of the material used in the given capacitor by charging and discharging the capacitor
4.	Determine the moment of inertia of the disc and rigidity modulus of the material of the given wire

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5.	Determine the radius of curvature of the given plano-convex lens, by Newton's rings
6.	Determine the Fermi energy and Fermi temperature of the given metal by studying the variation of resistance of wire of the material with temperature.
7.	Determine the knee voltage, breakdown voltage and forward resistance of the zener diode
8.	Determine the Numerical aperture of a given optical fiber using laser
9.	Determine the resistivity of semiconductor sample using four probe.
10.	Determine the acceleration due to gravity using a simple pendulum

Reference

"Engineering Physics Lab Manual", Presidency University (2020-21)

Course Name:	**General Physics**						**Type of Skill**	**Course addresses to**
Course Code:	**PHY 204**	**Credit Structure :**	**L**	**T**	**P**	**C**		
			2	**0**	**0**	**2**		

COURSE DESCRIPTION:

Electric Charge, Electric Fields, Gauss' Law, Electric Potential, Capacitance, Current and Resistance, Magnetic Fields, Magnetic Fields Due to Currents, Induction and Inductance, Electromagnetic Oscillations and Alternating Current, Maxwell's Equations; Electromagnetic Waves, Interference, Diffraction, Polarization, Relativity.

COURSE OUTCOME(S):

On completion of the course the student will be able to:

a. Use the laws and rules of electricity and magnetism.

b. Describe the characteristics of circuits that contain inductors, resistors, and capacitors in various combinations

c. Explain everyday phenomena based on properties of light.

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Text Book: Halliday, Resnik and Jearl Walker, "Principles of Physics", 10th Edition,

Wiley India, New Delhi, 2014.

Reference Book 1: Serway Raymond and Jewett John, "Physics for Scientists and Engineers with Modern Physics", 7th Edition, Cengage, 2010.

Reference Book 2: Hugh Young, Thomas Freedman and Lewis Ford, "University Physics with Modern Physics", 13th Edition, Pearson Education (India), 2013

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ANNEXURE III

PROPOSED LIST OF EXTERNAL EXAMINERS FOR BOS PANEL (Physics Board)

Sl. No.	Name of the Faculty and Address	Email ID	Phone No.	Institute Status
01	Dr. Suresh Kumar M. R Associate Professor and HOD Department of Physics RV Institute of Technology and Management. Kothanur, 8th Phase, JP Nagar, Bengaluru-560076.	sureshkumarmr.rvitm@rvei.edu.in	9886431547	Autonomous
02	Dr Shilpashree S P Assistant Professor Department of Physics Christ University Mysore Road, Kanmanike, Kumbalgodu, Bangalore - 560 060	shilpashreesp@gmail.com	9620958922	Christ University
03	Dr Kiran K S Professor and Head Jain University SOE & T, JGI Global Campus, Jakkasandra Post, Kanakapura	kiranxrd@gmail.com	9448419437	Jain University

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	Ramnagar, Bangalore-12			
4	Dr Ramdas Balan, Associate Professor, Department of Physics CMR Institute of Technology Bangalore-37	Email: ramdas.b@cmrit.ac.in	Phone:7760934530	Autonomous
5	Dr Prasanna G D Assistant Professor Department of Physics Davangere University Davangere-577007	Email: prasannagd@gmail.com	Phone: 9845238106	Davangere University

DETAILS OF INTERNAL EXAMINERS

Sl. No.	Faculty Name	Designation
1	Dr. Mohan Kumar Naidu	Associate Professor-HoD
2	Dr Deepthi P R	Associate Professor
3	Dr. U Mahaboob Pasha	Associate Professor
4	Dr. Sivasankar Reddy	Assistant Professor
5	Dr. Sreevidya Varma	Assistant Professor
6	Dr. T Ranjeth K Reddy	Assistant Professor
7	Dr. Naveen C S	Assistant Professor

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8	Dr. Anindita Bhattacharya	Assistant Professor
9	Dr. Harish Sharma A	Assistant Professor
10	Dr. Pradeep Bhaskar	Assistant Professor
11	Dr G. Srinivas Reddy	Assistant Professor
12	Dr. Bharathi D	Assistant Professor

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Value Added Courses **Annexure IV**

S.No	Name of the faculty	Course Code	Title of the VAC
1	Dr P Mohan Kumar Naidu	PHY V 001	Photovoltaic Solar Energy
2	Dr Deepthi P R	PHY V 002	Crystal Growth and Technology
3	Dr U Mahaboob Pasha	PHY V 003	Carbon sequestration and uranium bleaching
4	Dr Sivasankara Reddy N	PHY V 004	Glasses for X-Ray and Gamma Ray Shielding Applications
5	Dr G Sreevidya Varma	PHY V 005	Characterization techniques in Engineering
6	Dr T Ranjeth Kumar Reddy	PHY V 006	Solid State Physics
7	Dr Naveen C S	PHY V 007	Metal oxide nanomaterials for gas sensor applications
8	Dr Anindita Bhattacharya	PHY V 008	Nano structured materials
9	Dr Harish Sharma Akkera	PHY V 009	Semiconductor Optoelectronic Devices
10	Dr Pradeep Bhaskar	PHY V 010	Introduction to Polymers and Plastics
11	Dr G Srinivas Reddy	PHY V 011	Structure of Materials
12	Dr Bharathi D	PHY V 012	Nanotechnology

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5th BOS Formation

SoE	Physics	Chairman	Dr. Abdul Sharief	Dean, School of Engineering
		Member Secretary	Dr P Mohan Kumar Naidu	Associate Professor and HOD
		Member	Dr Deepthi P R	Associate Professor
		Member	Dr Anindita Bhattacharaya	Assistant Professor
		External Expert	Mr Sharath Kumar Prabhu	Associate Manager, Robert Bosch Engineering & Business Solutions PVT Ltd
		External Expert	Dr. VRK Murthy	Professor Emeritus (Former Professor of IIT Madras), Department of Physics, VIT-AP University, Amaravati, AP
		External Expert	Dr. S. Ramaprabhu	Professor (Emeritus), Professor (Emeritus), IIT Madras

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Ref.No. PU/SOE/ 2021-22/ BOS-05/CIR 01 Date: 05-08-2021

5th BOS MEETING NOTICE

5th Meeting of the Board of Studies of the Presidency University, School of Engineering, Physics is convened on Friday, 6th August 2021, at 02.00 p.m. online hosted from Presidency University Campus Itgalpur, Rajankunte, Yelahanka, Bengaluru-64. Kindly make it convenient to attend the meeting.

Agenda

Agenda SoE-5.1	To approve the minutes of 04th Board of Studies Meeting held on 28th August 2020.
Agenda SoE-5.2	Discussion on the feedback obtained on curriculum from the Industry, students, faculty members and alumni. Annexure-1
Agenda SoE-5.3	To consider and approve the Physics Course Content for all the Engineering Programs of 2021-22 batch as in Annexure 2. The course details are given in Annexure 3. Annexure- 2 Annexure -3
Agenda SoE-5.4	Any other matter with the permission of the Chair. (i) To ratify the course contents of 2019-2020 academic year courses of various programs and semesters as approved by the BOS chairpersons based on the approval of the respective Departmental Academic Committees[DAC] Annexure-4

City Office: University House, 8/1, King Street, Richmond Town, Bengaluru 560025
Campus: Presidency University, Itgalpur, Rajanakunte, Yelahanka, Bengaluru 560064
Phone: +91 80 49255533 / 5599 Email Id:info@presidencyuniversity.in

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To,

Members & Invitees,

S.No	Name	Affiliation	Position
1	Dr. Abdul Sharief	Dean, School of Engineering	Chairman
2	Dr P Mohan Kumar Naidu	Associate Professor and HOD	Member Secretary
3	Dr Deepthi P R	Associate Professor	Member
4	Dr Anindita Bhattacharaya	Assistant Professor	Member
5	Mr Sharath Kumar Prabhu	Associate Manager, Robert Bosch Engineering & Business Solutions PVT Ltd, Bengaluru	External Expert
6	Dr. VRK Murthy	Professor Emeritus (Former Professor of IIT Madras), Department of Physics, VIT-AP University, Amaravati, AP	External Expert
7	Dr. S. Ramaprabhu	Professor (Emeritus), Department of Physics, Indian Institute of Technology Madras, TN	External Expert

Permanent Invitees

Shri. Nissar Ahmed, Hon'ble Chancellor, Presidency University
Shri. Salman Ahmed, Hon'ble Board Member, PGI
Dr. D Subhakar, Vice Chancellor, Presidency University
Dr. Surendra Kumar, Pro Vice Chancellor, Presidency Univrsity

Chairperson

Member secretary

City Office: University House, 8/1, King Street, Richmond Town, Bengaluru 560025
Campus: Presidency University, Itgalpur, Rajanakunte, Yelahanka, Bengaluru 560064
Phone: +91 80 49255533 / 5599 Email Id:info@presidencyuniversity.in

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5th BOS MEETING ATTENDANCE

Microsoft Teams meeting link:

https://teams.microsoft.com/l/meetup-join/19%3ahhj9CxjRAwk6J8TOWaDGgmbhxM6WTJARvfCWsFftru01%40thread.tacv2/1628144866912?context=%7b%22Tid%22%3a%22bf93bb5e-ecf0-4e3d-be0e-79b5cc527a48%22%2c%22Oid%22%3a%22f5567898-925e-412b-9a2a-2a020813b9c5%22%7d

The meeting Attendance is given below:

Meeting Summary					
Total Number of Participants	7				
Meeting Title	General				
Meeting Start Time	8/6/2021, 1:37:57 PM				
Meeting End Time	8/6/2021, 4:12:54 PM				
Debug Id	cb02b175-8473-4277-86be-f886b1029628				
Full Name	Join Time	Leave Time	Duration	userPrincipalName	Role
U Mahaboob Pasha-Asso. Prof-PHY	8/6/2021, 1:37:57 PM	8/6/2021, 3:45:58 PM	2h 8m	mahaboobpasha@presidencyuniversity.in	Presenter
HoD Physics HoD Physics	8/6/2021, 1:42:50 PM	8/6/2021, 3:56:23 PM	2h 13m	hod_physics@presidencyuniversity.in	Organizer
Deepthi P R-Asso. Prof-PHY	8/6/2021, 1:44:09 PM	8/6/2021, 3:46:01 PM	2h 1m	deepthi.pr@presidencyuniversity.in	Presenter
Dr. Murty V R K	8/6/2021, 2:01:08 PM	8/6/2021, 3:45:53 PM	1h 44m	vrkm@vitap.ac.in	Presenter
Sharath Kumar Bollaje (MS/EEF55-PS)	8/6/2021, 2:01:36 PM	8/6/2021, 3:45:46 PM	1h 44m	bol5kor@bosch.com	Presenter
Anindita Bhattacharya-Asst. Prof-PHY	8/6/2021, 2:07:30 PM	8/6/2021, 3:46:03 PM	1h 38m	anindita@presidencyuniversity.in	Presenter
ramaprabhu (Guest)	8/6/2021, 2:08:13 PM	8/6/2021, 3:45:42 PM	1h 37m		Presenter
Dean SoE	8/6/2021, 2:53:37 PM	8/6/2021, 3:10:09 PM	16m 32s	deansoe@presidencyuniversity.in	Presenter
Dean SoE	8/6/2021, 3:14:32 PM	8/6/2021, 4:12:54 PM	58m 21s	deansoe@presidencyuniversity.in	Presenter

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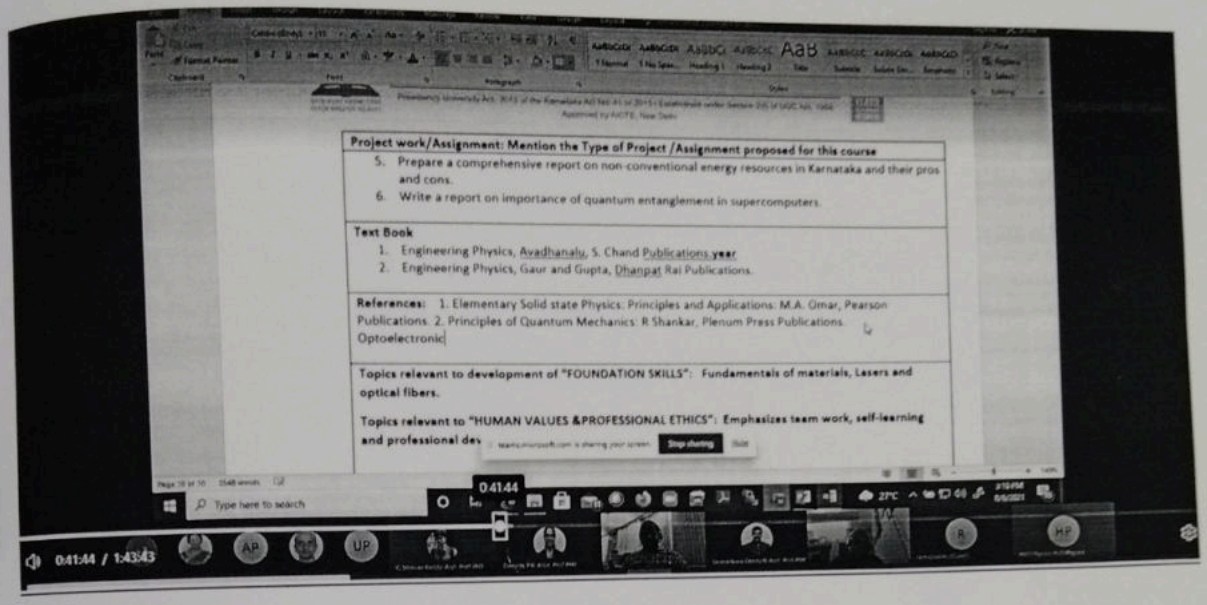
The MS Teams meeting screenshot as a note of attendance is inserted below.



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6th BOS Formation

SoE	Physics	Chairman	Dr. Abdul Sharief	Dean, School of Engineering
		Member Secretary	Dr Mahaboob Pasha	Professor and HOD
		Member	Dr Deepthi P R	Associate Professor
		Member	Dr Anindita Bhattacharaya	Associate Professor
		External Expert	Mr Sharath Kumar Prabhu	Associate Manager, Robert Bosch Engineering & Business Solutions PVT Ltd
		External Expert	Dr. VRK Murthy	Professor Emeritus (Former Professor of IIT Madras), Department of Physics, VIT-AP University, Amaravati, AP
		External Expert	Dr. S. Ramaprabhu	Professor (Emeritus), Professor (Emeritus), IIT Madras
		Special Invitee	Dr P Mohan Kumar Naidu	Professor

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Ref.No. PU/SOE/ 2021-22/ BOS-06/CIR 02 Date: 21-01-2022

6th BOS MEETING NOTICE

6th Meeting of the Board of Studies of the Presidency University, School of Engineering, Physics is convened on Saturday, 21st January 2022, at 11.00 a.m. **online** hosted from Presidency University Campus Itgalpur, Rajankunte, Yelahanka, Bengaluru-64. Kindly make it convenient to attend the meeting.

Agenda

Agenda SoE-6.1	To approve the minutes of 05th Board of Studies Meeting held on 6th August 2021.
Agenda SoE-6.2	Any other matter with the permission of the Chair.

To,

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Members & Invitees,

S.No	Name	Affiliation	Position
1	Dr. Abdul Sharief	Dean, School of Engineering	Chairman
2	Dr Mahaboob Pasha U	Professor and HOD	Member Secretary
3	Dr Deepthi P R	Associate Professor	Member
4	Dr Anindita Bhattacharaya	Associate Professor	Member
5	Mr Sharath Kumar Prabhu	Associate Manager, Robert Bosch Engineering & Business Solutions PVT Ltd, Bengaluru	External Expert
6	Dr. VRK Murthy	Professor Emeritus (Former Professor of IIT Madras), Department of Physics, VIT-AP University, Amaravati, AP	External Expert
7	Dr. S. Ramaprabhu	Professor (Emeritus), Department of Physics, Indian Institute of Technology Madras, TN	External Expert
8	Dr P Mohan Kumar Naidu	Professor	Special Invitee

Permanent Invitees

Shri. Nissar Ahmed, Hon'ble Chancellor, Presidency University
Shri. Salman Ahmed, Hon'ble Board Member, PGI
Dr. D Subhakar, Vice Chancellor, Presidency University
Dr. Surendra Kumar, Pro Vice Chancellor, Presidency Univrsity

Member secretary

Chairperson

6th BOS MEETING ATTENDANCE

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Zoom meeting link:

Topic: 6th BOS Meeting-PHY
Time: Jan 22, 2022 11:00 AM India

Join Zoom Meeting
https://us05web.zoom.us/j/4645043204?pwd=UXpRRzRZWGwydmkvQk0vWEp1SEFWUT09

Meeting ID: 464 504 3204
Passcode: z3ycTr

The Zoom meeting screenshot as a note of attendance is inserted below.

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SCHOOL OF ENGINEERING

Department of Physics

Ref. No.: PU/SOE/PHY/BOS-5/2021-22/MOM-02 Date 22nd January, 2022

Minutes of the 6th Meeting of Board of Studies (Department of Physics)

The 6th meeting of the Board of Studies of Department of Physics was held on 22-01-2022 at 11.00am in Online Mode via the zoom meeting link.

https://us05web.zoom.us/j/4645043204?pwd=UXpRRzRZWGwydmkvQk0vWEp1SEFWUT09 hosted by Presidency University Itgalpur, Rajankunte, Yelahanka, Bengaluru.

6th BOS Committee members:

S No	Name	Affiliation	Position
1.	Dr. Abdul Sharief	Dean, School of Engineering	Chairman
2.	Dr. Mahaboob Pasha	Professor & Head of the Department	Member Secretary
3.	Dr. Deepthi P R	Associate Professor	Member
4.	Dr. Anindita B	Associate Professor	Member
5.	Mr. Sharath Kumar Prabhu	Associate Manager, Robert Bosch Engineering & Business Solutions PVT Ltd	External Expert
6.	Dr. VRK Murthy	Professor Emeritus (Former Professor of IIT Madras), Department of Physics, VIT-AP University, Amaravati, AP	External Expert
7.	Dr. S. Ramaprabhu	Professor (Emeritus), Department of Physics, IIT Madras, TN	External Expert
8.	Dr. P Mohan Kumnar Naidu	Professor	Special Invitee

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The member secretary/ HOD extended a warm welcome to the members, particularly to the external members and introduced all the members in the committee. The chairman of 6th BoS meeting,Dr Abdul Sharief delivered the opening remarks by requesting BOS members to deliberate on each agenda and to provide constructive suggestions for the courses.

With the permission of chairperson, the member secretary had presented the following agendapoints and deliberations were recorded.

Agenda SOE-PHY 6.1: To approve the minutes of 5th Board of Studies Meeting held on 6th August, 2021

The member secretary presented the approved courses and MOM of 5th BOS meeting.

Resolution SOE-PHY 6.1: The Minutes of 5th BOS meeting held on 6th August 2021 was discussed and approved by the members.

Agenda SOE-PHY 6.2: Any Other Matter with the permission of the chair

External members suggested a few changes in the titles of courses like "Composite Materials-ASTM Standards" PHY2006 as "Composite Materials". "Solid State Physics" PHY V 006 as "Condensed Matter Physics"

Resolution SOE-PHY 6.2: The committee members decided to discuss these changes in the following DAC meeting and implement so.

The BOS Chairperson has assured that the decisions taken during the 6th BOS meeting for Department of Physics will be implemented as early as possible and will be conveyed. The Chairperson and member secretary had expressed special thanks to all the members and requested to extend the same support for the future activities.

The meeting ended with Vote of Thanks by Dr. P Mohan Kumar Naidu

Table 1: List of approved School Courses

Course Name	Course Code	Type of Course	L-P-C	School
1. Material Physics	PHY 1001	1. School Core &Laboratory Integrated	2-2-3	SoE
2. Optoelectronics and Device Physics	PHY 1002	1. School Core & Laboratory Integrated	2-2-3	SoE

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2. Essentials of Physics	PHY 1009	1. School Core	2-0-2	SoD

Table 2: List of approved Open Elective Courses

Course Name	Course Code	L-P-C
1. Mechanics and Physics of Materials	PHY1003	2-0-2
2. Astronomy	PHY1004	2-0-2
3. Game Physics	PHY1005	2-2-3
4. Statistical Mechanics	PHY1006	2-0-2
5. Physics of Nanomaterials	PHY1007	3-0-3
6. Adventures in Nanoworld	PHY1008	3-0-3
7. Essentials of Physics	PHY 1009	2-0-2
8. Medical Physics	PHY2001	3-0-3
9. Sensor Physics	PHY2002	2-2-3
10. Computational Physics	PHY2003	2-0-2
11. Laser Physics	PHY2004	2-0-2
12. Science and Technology of Energy	PHY2005	3-0-3
13. Composite Materials-ASTM Standards	PHY2006	3-0-3

Table 3: List of approved Value Added Courses

Course Name	Course Code	Faculty offering the course
1. Photovoltaic Solar Energy	PHY V 001	Dr P Mohan Kumar Naidu
2. Crystal Growth and Technology	PHY V 002	Dr Deepthi P R

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3. Carbon sequestration and uranium bleaching	PHY V 003	Dr U Mahaboob Pasha
4. Glasses for X-Ray and Gamma Ray Shielding Applications	PHY V 004	Dr Sivasankara Reddy N
5. Characterization Techniques in Engineering	PHY V 005	Dr Anindita B
6. Solid State Physics	PHY V 006	Dr T Ranjeth Kumar Reddy
7. Metal oxide nanomaterials for gas sensor applications	PHY V 007	Dr Naveen C S
8. Nano structured materials	PHY V 008	Dr. Anindita B
9. Semiconductor Optoelectronic Devices	PHY V 009	Dr Harish Sharma Akkera
10. Introduction to Polymers and Plastics	PHY V 010	Dr Pradeep Bhaskar
11. Structure of Materials	PHY V 011	Dr G Srinivas Reddy
12. Nanotechnology	PHY V 012	Dr Bharathi D
13. Origin- Scientific graphing and data analysis	PHY V 013	Dr Deepthi P R
14. Physics in Games	PHY V 014	Dr Pradeep Bhaskar
15. Advanced Amorphous Materials	PHY V 015	Dr Sivasankara Reddy N
16. Physics of Glass and ceramics	PHY V 016	Dr U Mahaboob Pasha
17. Electromagnetic Theory and Application	PHY V 017	Dr G Srinivas Reddy

BOS Committee Members

S No	Name	Position	Signature with date
1.	Dr. Abdul Sharief	Chairman	Present
2.	Dr. Mahaboob Pasha	Member Secretary	Present

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3.	Dr. Deepthi P R	Member	Present
4.	Dr. Anindita B	Member	Present
5.	Mr. Sharath Kumar Prabhu	External Expert	Present
6.	Dr. VRK Murthy	External Expert	Present
7.	Dr. S. Ramaprabhu	External Expert	Present
8.	Dr. P Mohan Kumnar Naidu	Special Invitee	Present

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SCHOOL OF ENGINEERING

Department of Physics

Ref. No.: PU/SOE/PHY/BOS-7/2022-23/MOM-01 Date 25th July, 2022

Minutes of the 7th Meeting of Board of Studies (Department of Physics)

The 7th meeting of the Board of Studies of Department of Physics was held on 25-07-2022 at 11.00am in Online Mode via the MS Teams link.
https://teams.microsoft.com/l/meetup-join/19%3ahhj9CxjRAwk6J8TOWaDGgmbhxM6WTJARvfCWsFftru01%40thread.tacv2/1658557343107?context=%7b%22Tid%22%3a%22bf93bb5e-ecf0-4e3d-be0e-79b5cc527a48%22%2c%22Oid%22%3a%22f5567898-925e-412b-9a2a-2a020813b9c5%22%7d
hosted by Presidency University Itgalpur, Rajankunte, Yelahanka, Bengaluru.

7th BOS Committee members:

S No	Name	Affiliation	Position
1.	Dr. Abdul Sharief	Dean, School of Engineering	Chairman
2.	Dr. Mahaboob Pasha	Professor & Head of the Department	Member Secretary
3.	Dr. Deepthi P R	Associate Professor	Member
4.	Dr. Anindita B	Associate Professor	Member
5.	Mr. Sharath Kumar Prabhu	Associate Manager, Robert Bosch Engineering & Business Solutions PVT Ltd	External Expert
6.	Dr. VRK Murthy	Professor Emeritus (Former Professor of IIT Madras), Department of Physics, VIT-AP University, Amaravati, AP	External Expert
7.	Dr. S. Ramaprabhu	Professor (Emeritus), Department of Physics, IIT Madras, TN	External Expert
8.	Dr. Shilpa Mehta	Dean Academics, Presidency University	Special Invitee
8.	Dr. P Mohan Kumnar Naidu	Professor	Special Invitee

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The member secretary/ HOD extended a warm welcome to the members, particularly to the external members and introduced all the members in the committee. The chairman of 7th BOS meeting,Dr Abdul Sharief delivered the opening remarks by requesting BOS members to deliberate on each agenda and to provide constructive suggestions for the courses.

With the permission of chairperson, the member secretary had presented the following agendapoints and deliberations were recorded.

Agenda SOE-PHY 7.1: To approve the minutes of 6th Board of Studies Meeting held on 22nd January, 2021

The member secretary presented the MOM of 6th BOS meeting.

Resolution SOE-PHY 7.1: The Minutes of 6th BOS meeting held on 22nd January, 2022 was discussed and approved by the members.

Agenda SOE-PHY 7.2: Discussion on the feedback obtained on curriculum from the Industry, students, faculty members and alumni.

Resolution SOE-PHY 7.2: The member secretary presented the gist of feedback obtained on existing curriculum from Industry, students, alumni & faculty members as listed in Annexure 1. The new and revisions for the courses were proposed and the same was approved. All the members have appreciated the efforts.

Agenda SOE-PHY 7.3: To consider and approve the Physics Course Content for all the Engineering Programs and SoD of AY 2022-23 batch as shown in Annexure 2

Resolution SOE-PHY 7.3: The member secretary presented the new course and revisions in the course content for all Engineering programs and SoD (School of Design) as listed in Annexure - 2, and the same were approved.

i. According to the list of courses in Table1, Table 2 and Table 3 the proposed changes are approved by the members.
ii. Inclusion of new open elective course “Waves and Mechanics” (PHY 1010, 3-0-3) was approved.
iii. The open elective course “Composite Materials-ASTM standards” (PHY 2006, 3-0-3) is ratified and a new course “Composite Materials” (PHY 2007, 3-0-3) was approved.
iv. The value added course “Solid state Physics” (PHY V 006) is ratified and “Condensed Matter Physics” (PHY V 018) was approved.

1. The list of courses was duly approved by all members with discussion on the following

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points. The list of courses approved by members are illustrated in the following tables.

i. According to the suggestions of Board members the title 'Optoelectronics and Device Physics' may be reconsidered as 'Optoelectronics and Semiconductor Physics' in future.

ii. External members have suggested to include some topics like Liquid crystals in the course 'Optoelectronics and Device Physics' to make the syllabus more aligned to the course title.

iii. According to the suggestions of external members following changes are made in 'Material Physics PHY 1001' course.
   a. Module 2 is renamed as "Mechanical Properties of materials".
   b. Module 4 is renamed as " Nanomaterials and Nanoscience"

iv. External members have suggested to include more animation supported teaching in the course "Essentials of Physics" incorporating python programming in future.

v.

Table 1: List of approved School Courses

Course Name	Course Code	Type of Course	L-P-C	School
1. Material Physics	PHY 1001	1. School Core &Laboratory Integrated	2-2-3	SoE
2. Optoelectronics and Device Physics	PHY 1002	1. School Core & Laboratory Integrated	2-2-3	SoE
3. Essentials of Physics	PHY 1009	1. School Core	2-0-2	SoD

Table 2: List of approved Open Elective Courses

Course Name	Course Code	L-P-C
1. Mechanics and Physics of Materials	PHY1003	2-0-2
2. Astronomy	PHY1004	2-0-2
3. Game Physics	PHY1005	2-2-3
4. Statistical Mechanics	PHY1006	2-0-2
5. Physics of Nanomaterials	PHY1007	3-0-3
6. Adventures in Nanoworld	PHY1008	3-0-3
7. Waves and Mechanics	PHY 1010	3-0-3
8. Medical Physics	PHY2001	3-0-3

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9. Sensor Physics	PHY2002	2-2-3
10. Computational Physics	PHY2003	2-0-2
11. Laser Physics	PHY2004	2-0-2
12. Science and Technology of Energy	PHY2005	3-0-3
~~**13.** Composite Materials-ASTM Standards~~	~~PHY2006~~	~~3-0-3~~
13.Composite Materials	PHY2007	3-0-3

Table 3: List of approved Value Added Courses

Course Name	Course Code	Faculty offering the course
1. Photovoltaic Solar Energy	PHY V 001	Dr P Mohan Kumar Naidu
2. Crystal Growth and Technology	PHY V 002	Dr Deepthi P R
3. Carbon sequestration and uranium bleaching	PHY V 003	Dr U Mahaboob Pasha
4. Glasses for X-Ray and Gamma Ray Shielding Applications	PHY V 004	Dr Sivasankara Reddy N
5. Characterization Techniques in Engineering	PHY V 005	Dr Anindita B
6.Metal oxide nanomaterials for gas sensor applications	PHY V 007	Dr Naveen C S
7.Nano structured materials	PHY V 008	Dr. Anindita B
8. Semiconductor Optoelectronic Devices	PHY V 009	Dr Harish Sharma Akkera
9.Introduction to Polymers and Plastics	PHY V 010	Dr Pradeep Bhaskar
10.Structure of Materials	PHY V 011	Dr G Srinivas Reddy
11.Nanotechnology	PHY V 012	Dr Bharathi D
12.Origin- Scientific graphing and data analysis	PHY V 013	Dr Deepthi P R

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13. Physics in Games	PHY V 014	Dr Pradeep Bhaskar
14.Advanced Amorphous Materials	PHY V 015	Dr Sivasankara Reddy N
15.Physics of Glass and ceramics	PHY V 016	Dr U Mahaboob Pasha
16.Electromagnetic Theory and Application	PHY V 017	Dr G Srinivas Reddy
17.Condensed Matter Physics	PHY V 018	Dr Ranjeth Kumar Reddy

Agenda SOE-PHY 7.4: Approval of External and Internal Examiners given in Annexure 3.

The member secretary presented the proposed list of Internal and External members for BOE Panel (Physics Board).

Resolution SOE-PHY 7.4

1. The list of Internal and External examiners were approved by all members. The list of examiners approved by members are illustrated in Annexure 3.

Agenda SOE-PHY 7.5: Any Other Matter with the permission of the chair

External members encouraged more discussions regarding the syllabus and teaching techniques within the department.

Resolution SOE-PHY 7.5: The committee members decided to discuss the suggestions from the meeting in the following DAC meeting and implement so.
The BOS Chairperson has assured that the decisions taken during the 7th BOS meeting for Department of Physics will be implemented as early as possible and will be conveyed. The Chairperson and member secretary had expressed special thanks to all the members and requested to extend the same support for the future activities.

The meeting ended with Vote of Thanks by Dr. Anindita Bhattacharya.

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BOS Committee Members

S No	Name	Position	Signature with date
1.	Dr. Abdul Sharief	Chairman	Present
2.	Dr. Mahaboob Pasha	Member Secretary	Present
3.	Dr. Deepthi P R	Member	Present
4.	Dr. Anindita B	Member	Present
5.	Mr. Sharath Kumar Prabhu	External Expert	Present
6.	Dr. VRK Murthy	External Expert	Present
7.	Dr. S. Ramaprabhu	External Expert	Absent
8.	Dr. Shilpa Mehta	Special Invitee	Present
8.	Dr. P Mohan Kumnar Naidu	Special Invitee	Present

Screenshot of the 7th BOS meeting

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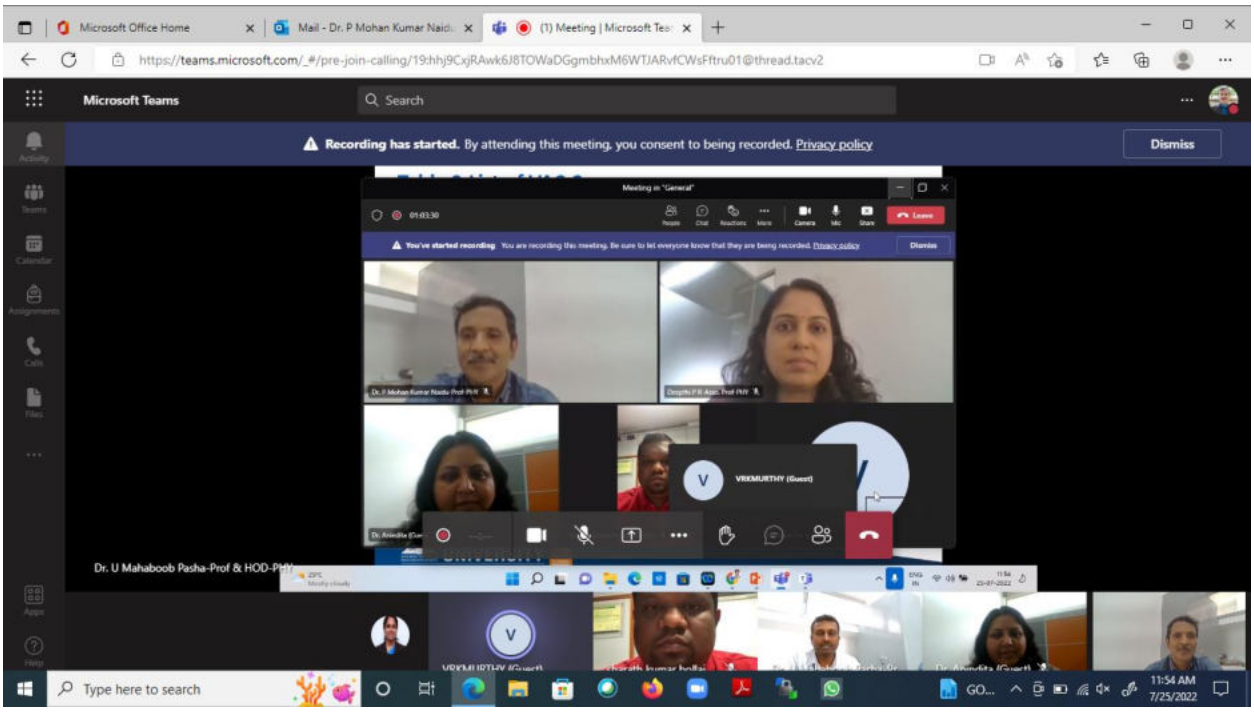

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Annexure 1

Department of Physics

Ref. No: PU/SOE/PHY/ATR/BOS-07/2022-23 **Date: 20th July 2022**

Action taken Report on Curriculum Feedback

Feedback from Industry members and action taken report

Sl. No.	Feedback Received	Action Taken
1.	Introduce Industry linked advanced theory and practical sessions by Industrial experts will add the level of exposure to students & faculty	Every semester Guest lectures, Invited talks and workshops are being organized to expose students and faculty to latest developments in the industry. Students as well as faculty are supported and encouraged to participate in National and International conferences, workshops Industry expos and symposium

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Feedback from Faculty members and action taken report

Sl. No.	Feedback Received	Action Taken
1	Introduce more field based activities and practical sessions as part of courses	Separate slots have been assigned for active learning classes on Saturday to accommodate field based activities and practical sessions to link theory with lab
2	Need to allot more teaching/tutorial hours for design based courses/numerical based courses	The course contents are planned according to the lecture and tutorial hours available. However, there might have been a need felt to engage more tutorial hours only for slow learners. Remedial classes are being arranged for slow learners after regular working hours.

Feedback from students and Action Taken Report

SOE-PHYSICS

Sl No.	Feedback	Action Taken
1	Include topics wherein Physics concepts are aligned with computer science and related branches	Quantum concepts is introduced in the revised syllabus.
2	Curriculum can be aligned considering the modern day demand in the field of computer science and allied branches	Introduced Quantum concepts in the curriculum and more such relevant topics will be planned to inculcate
3	Some units can be replaced and some applicable concepts/areas can be added.	The unit is replaced and included.
4	Few Concepts can be taught in terms of experiential learning	To experience the concepts activity sessions are conducted and student will do hand on experiment on the different concepts.
5	More visibility should be given to the students on open electives floated by basic science department	Has conveyed to the Engineering Heads to canvas about the electives floated by science departments
6	It is good if few concepts are taught with more depth.	Will be incorporated in our lecturing sessions
7	More prescribed books for references must be included.	Suggestion is considered and will be included in the next AY
8	My advice is to reduce the no. of units/merge the relevant units and make as modules.	Suggestion is considered and module system is made by merging two or more units.
9	Discuss the concepts in more depth, increase problem solving content	Suggestion is considered and problem solving content is included.

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10	Application oriented/industry based syllabus to be included	The revised syllabus is more of application oriented

Based on the feedback received from stakeholders, the following new and revised courses were proposed in the 7th BOS.

Revised Courses

1. Material Physics (PHY 1001)

2. Optoelectronics and device physics (PHY 1002)

3. Essentials of Physics (PHY1009)

4. Mechanics and Physics of materials (PHY1003)

5. Astronomy (PHY1004)

6. Statistical Mechanics (PHY1006)

7. Physics of Nanomaterials (PHY1007)

8 Adventures in Nanoworld (PHY1008)

9. Medical Physics (PHY2001)

10. Sensor Physics (PHY2002)

11. Computational Physics (PHY2003)

12. LASER Physics (PHY2004)

13. Science and Technology of Energy (PHY2005)

15. Game Physics (PHY1005)

New Courses

1. Composite Materials (PHY2007)
2. Waves and Mechanics (PHY 1010)

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Annexure 2

The approved new and revised course catalogues are given below.

Material Physics PHY1001

Course Code: PHY1001	**Course Title:** Material Physics **Type of Course:** 1] School Core & Laboratory integrated	**L-P-C**	2	2	3
Version No.	1.0				
Course Pre-requisites	**NIL**				
Anti-requisites	**NIL**				
Course Description	The course is intended to provide an overview of physics principles which determine the properties and behavior of materials. This knowledge will help students in identifying the most suitable material for a desired function and in estimating their behavior under different environmental conditions**.** This theory course integrated with lab providing practical application of the concepts taught while developing an **attitude of enquiry and confidence to tackle new problems**. The course also develops **team working and report writing skills through project work and assignments.**				
Course Out Comes	On successful completion of the course the students shall be able to: 1] Describe the mechanical, thermal and corrosive properties of materials. 2] Identify the crystal structure of materials from X-ray diffraction patterns. 3] Analyze the importance of material properties for a wide range of engineering applications. 4] Students can able to Design, build, or assemble a part, product, or system using specific methodologies, equipment and materials. (Lab objective)				
Course Objective	The course is designed to improve the learners EMPLOYABILITY SKILLS by using EXPERIENTIAL LEARNING techniques.				

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Course Content:				
Module 1	**Introduction to crystallography**	Assignment	Prepare models of crystal structures	**No. of classes: 8**
Topics: Types of bonging in solids, Space lattice and unit cells, Bravais Lattices~~, crystal system and symmetry,~~ Miller Indices, calculation of packing fractions, coordination number, Bragg's law, principle of X-Ray diffraction and structure determination, Defects. ~~Significance of defects and imperfections in real time applications.~~				
Module 2	**Mechanical, Wave properties of Materials**	Assignment	Data collection	**No. of classes: 7**
Mechanical properties: Elastic behavior of materials, concept of stress and strain, ductile materials, brittle materials, toughness, hardness, tensile property, yield point phenomenon. Comparison between metal, ceramic and plastics properties.				
Module 3	**Thermal and corrosive properties of materials**	Term paper	Write/Modify a Program using Excel to calculate specific heat and thermal expansion	**No. of classes : 8**
Topics: Thermal properties such as specific heat, thermal conductivity, thermal expansion, Calorimeter, ~~thermal shock resistance~~, thermoelectric effect, thermopile. Basics of corrosion, types of corrosion and methods to prevent corrosion.				
Module 4	**Introduction to Nano Technology**	Term paper	Case study on applications of Nano materials	**No. of classes: 7**
Topics: Introduction to Nano-materials and Properties, effect of Quantum confinement on material properties. Carbon Nano-tubes (CNT). Applications of nanotechnology in various fields ~~Production technologies, Material surface protection, medical and sustainable environment~~.				
List of Laboratory Tasks: Experiment No. 1: Experimental errors and uncertainty using excel Level 1: Calculation of accuracy and precision of a given data Level 2: propagation of errors in addition, subtraction, multiplication and division.				

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Experiment No. 2: Determination of rigidity modulus using torsional pendulum
Level 1: Determination of rigidity modulus of a steel wire using a circular disc.
Level 2: Determination of moment of inertia of irregular body using the steel wire.

Experiment No. 3: Determination of the Young's Modulus of a wire or uniform bar
Level 1: Determination of the Young's Modulus of a given wire or uniform bar of known cross section
Level 2: Plot the stress vs. strain graph and estimate Young's modulus from the graph and compare the results. Determine the material by referring to standards handbook.

Experiment No. 4: Determine the specific heat capacity of a material using a calorimeter
Level 1: Determine the specific heat capacity of (Copper, lead, glass) using a calorimeter.
Level 2: Determine the absolute specific heat of the calorimeter using a material of known specific heat.

Experiment No. 5: Calculation of lattice parameter and particle size using X-ray diffraction pattern
Level 1: Crystallite size calculation using Scherrer's formula
Level 2: Crystallite size and microstrain broadening of diffraction peaks

Experiment No. 6: Calculate the spring constant
Level 1: Calculate the spring constant of a set of parallel / series connected springs
Level 2: Calculate the spring constant of a combination of parallel and series springs

Experiment No. 7: Thermal conductivity of a non-metallic solid
Level 1: Determine the coefficient of thermal conductivity of a bad-conductor by Lee`s & Charlton's disc method.
Level 2: Determine the coefficient of thermal conductivity of a metal by using Searle's apparatus.

Experiment No. 8: Experiment based on Seebeck effect.
Level 1: To study the variation of thermo EMF with temperature of hot junction for copper-iron thermocouple by means of potentiometer
Level 2: The comparative study of the variation of thermo EMF with temperature of hot junction for different thermocouple by means of potentiometer

Experiment No. 9: To determine elastic constants of a wire by Searles's method
Level 1: To determine Young modulus, Modulus of rigidity
Level 2: To determine Poisson`s ratio, Bulk modulus

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Experiment No. 10: To plot the characteristics of thermistor and hence find the temperature coefficient of resistance.
Level 1: Determine Positive temperature coefficient (**PTC**) thermistor:-resistance increase with increase in temperature.
Level 2: Determine Negative temperature coefficient (**NTC**) thermistor:-resistance decrease with increase in temperature and compare the results of PTC and NTC.

Experiment No. 11: Determination of Fermi energy
Level 1: Determination of Fermi energy of copper coil
Level 2: Determination of Fermi energy of alloy (Brass)

Experiment No. 12: Elastic and plastic deformation
Level 1: To investigate the elastic and plastic extension of metal wires (determination of spring constant and Young's modulus)
Level 2: To investigate the elastic and plastic extension of alloy from the stress strain graph and determine the elastic limits

~~Experiment No. 13: Speed of Sound using Kundt's tube~~
~~Level 1: To find the speed of sound.~~

~~Experiment No.14: Determine the velocity of ultrasonic waves in a liquid~~
~~Level 1: To determine the velocity of ultrasonic waves in a liquid~~

Experiment No.15: Four probe method
Level 1: To determine the resistivity of a given semiconductor using four probe method.

Targeted Application & Tools that can be used:

1. Application area in determination of standard values using UTM machine, strength of materials, building materials, machine tools.
2. Microsoft Excel for mathematical calculations.
3. JCPDS data for XRD analysis, ASTM.

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course

Assessment Type

- Midterm exam
- Assignment (review of digital/ e-resource from PU link given in references section - mandatory to submit screen shot accessing digital resource.)
- Quiz
- End Term Exam
- Self-Learning

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1.Identify the crystal planes and directions for a given crystal structure (Schematic)

2. Draw the plane and directions for a given miller indices (Ex. (111), (110), (010), ($1\bar{1}$ 1) <110>)

3. Collect the data like, Elastic modulus, Stiffness, Ultimate Tensile Strength, Yield point for a given material.

4. Determine the mechanical properties of given sample (Ex. Aluminum) , ASTM standards

Text Book

1. M.A. Wahab, Structure and Properties of Materials, Solid State Physics, Third Edition, Narosa Publications 2015.

References:

1. Charles P. Poole Jr, Frank J. Owens, Introduction to Nanotechnology, ISBN: 0471079359. Wiley Publications, 2003.
2. P.N. Chandramouli, Fundamentals of Strength of Materials, PHI learning Private Limited, 2013.
3. Chares Kittel, Introduction to Solid State Physics, Wiley publications, 2015.
4. Engineering Physics by Avadhanalu, Revised edition, S. Chand Publications,2018

Material Physics e-content:

1. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=517049&site=ehost-live
2. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=826470&site=ehost-live
3. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=2356447&site=ehost-live
4. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1761854&site=ehost-live
5. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=2948421&site=ehost-live
6. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=810004&site=ehost-live

Topics relevant to development of "FOUNDATION SKILLS": Elastic, thermal and mechanical properties of materials.

Topics relevant to "HUMAN VALUES &PROFESSIONAL ETHICS": Emphasizes team work, self-learning and professional development.

Catalogue prepared by	Dr. G. Srinivas Reddy, Dr. Harish Sharma A, Dr. Pradeep Bhaskar, Dr. Ranjeth Kumar Reddy, Dr. P. Mohan Kumar Naidu,Dr. Deepthi P. R, Dr. U. Mahaboob Pasha, Dr. Sivasankara Reddy, Dr. Anindita, Dr. Naveen C. S, Dr. Bharati .
Recommended by the Board of Studies on	7th BOS, 25th July 2022
Date of Approval by the	Mention the Academic Council Meeting No. & the date of the meeting:

REGISTRAR

Academic Council	

Optoelectronics and Device Physics PHY1002

Course Code: PHY1002	**Course Title: Optoelectronics and Device Physics** **Type of Course: 1] School Core & Laboratory integrated**	L-P-C	2	2	3
Version No.	1.0				
Course Pre-requisites	**NIL**				
Anti-requisites	**NIL**				
Course Description	The purpose of this course is to enable the students to understand the fundamentals, working and applications of optoelectronic devices and to develop the basic abilities to appreciate the applications of advanced microscopy and quantum computers. The course develops the critical thinking, experimental and analytical skills. The associated laboratory provides an opportunity to validate the concepts taught and enhances the ability to use the concepts for technological applications. The laboratory tasks aim to develop following skills: **An attitude of enquiry, confidence and ability to tackle new problems, ability to interpret events and results, observe and measure physical phenomena, select suitable equipment, instrument and materials, locate faults in systems.**				
Course Out Comes	On successful completion of the course the students shall be able to: CO1: Describe the concepts of semiconductors, magnetic materials and superconductors. CO2: Apply the concept of materials in the working of optoelectronic and magnetic devices. CO3: Discuss the quantum concepts used in advanced microscopy and quantum computers. CO4: Explain the applications of lasers and optical fibers in various technological fields. CO5: Interpret the results of various experiments to verify the concepts used in optoelectronics and advanced devices. **[Lab oriented].**				

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Course Objective	The course is designed to improve the learners EMPLOYABILITY SKILLS by using EXPERIENTIAL LEARNING techniques.			
Course Content:				
Module 1	**Fundamentals of Materials.**	Assignment	Plotting of magnetization (M) v/s Magnetic field (H) for diamagnetic, paramagnetic and ferromagnetic materials using excel/ origin software.	**No. of Classes: 07**
Topics: Concept of energy bands, charge carriers, ~~carrier concentration~~, concept of Fermi level, Hall effect, Magnetic materials, Superconductors: ~~Josephson effect.~~				
Module 2	**Advanced Devices and applications**	Assignment	Data collection on efficiency of solar cells.	**No. of Classes: 8**
Topics: p-n junctions, Zener diode, transistor characteristics, Optoelectronic devices:, Solar cells, photo detectors and LEDs, Magnetic materials in memory devices, ~~Spintronics, SQUIDS in superfast computers, SQUIDS in medical field.~~				
Module 3	**Quantum concepts and Applications**	Term paper	Seminar on quantum computers.	**No. of classes: 8**
Topics: Planck's quantum theory, applications of Quantum theory: Temperature sensor, de-Broglie hypothesis, ~~applications-Scanning Electron Microscope (SEM),~~ Heisenberg's uncertainty principle, ~~Quantum Tunneling, Quantum Tunneling, Quantum computers (Qualitative).~~				
Module 4	**Lasers and Optical fibers**	Term paper	Case study on medical applications of Lasers.	**No. of classes :07**

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Topics: Interactions of radiations with matter, Characteristics of laser, conditions and requisites of laser, Modern day applications of laser: LIDAR, LASIK, Cutting, Welding and Drilling.

Principle of optical fibers, Numerical aperture and acceptance angle (Qualitative), Applications: Point to point communication with block diagram, ~~application of optical fibers in endoscopy.~~

List of Laboratory Tasks:

Experiment No. 1: Experimental errors and uncertainty using excel

Level 1: Calculation of accuracy and precision of a given data

Level 2: propagation of errors in addition, subtraction, multiplication and division.

Experiment N0 2: To determine the wavelength of semiconductor diode Laser and to estimate the particle size of lycopodium powder using diffraction.

Level 1: Determination of Wavelength of Laser
Level 2: Finding the particle size of lycopodium powder.

Experiment No. 3: To determine the proportionality of Hall Voltage, magnetic flux density and the polarity of Charge carrier.
Level 1: To determine the proportionality of Hall Voltage and magnetic flux density
Level 2: To determine the polarity of Charge carrier.

Experiment No. 4: To study the I-V characteristics of a given zener diode in forward and reverse bias conditions.

Level 1: To study I –V characteristics of the given Zener diode in reverse bias and to determine break down voltage.
Level 2: To study I –V characteristics of the given Zener diode in forward bias and to determine knee voltage and forward resistance.

Experiment No. 5: To study input and output characteristics of a given Transistor.

Level 1: To determine the input resistance of a given transistor.
Level 2: To determine current transfer characteristics and transistor parameters of a given transistor.

Experiment No. 6: Determination of Fermi energy and Fermi temperature of a given metal and bimetallic wire.

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Level 1: Determination of Fermi energy and Fermi temperature of given metal wire.

Level 2: Determination of Fermi energy and Fermi temperature of given bimetallic wire.

Experiment No. 7: To study the current vs voltage characteristics of CdS photo-resistor at constant irradiance and To measure the photo-current as a function of the irradiance at constant voltage.

Level 1 To study the current vs voltage characteristics of CdS photo-resistor at constant irradiance.
Level 2: To measure the photo-current as a function of the irradiance at constant voltage.

Experiment No. 8: To study the I-V characteristics and I-R characteristics of a solar cell as a function of the irradiance.
Level 1: To study the I-V characteristics
Level 2: I-R characteristics of a solar cell as a function of the irradiance.

Experiment No. 9: Calculate the numerical aperture and study the losses that occur in optical fiber cable. .
Level 1: Calculate the numerical aperture.
Level 2: study the losses that occur in optical fiber cable.

Experiment No. 10: To determine the magnetic susceptibility of a given diamagnetic and paramagnetic substances using Quincke's method.
Level 1: To determine the magnetic susceptibility of a given diamagnetic substance.
Level 2: To determine the magnetic susceptibility of a given paramagnetic substance.

Experiment No. 11: To study the hysteresis loop of an iron core and to find its coercivity and retentivity. To show the effect of varying voltage and frequency on hysteresis loop.
Level 1: To study the hysteresis loop of an iron core and to find its coercivity and retentivity. .
Level 2: To show the effect of varying voltage and frequency on hysteresis loop.

Experiment No. 12: Determining the wavelength of the electrons for different accelerator voltages by applying the Bragg condition and Confirming the de Broglie equation for the wavelength.
Level 1: Determining the wavelength of the electrons for different accelerator voltages by applying the Bragg condition.
Level 2: Confirming the de Broglie equation for the wavelength.

Experiment No. 13: To measure the transition temperature and resistivity of a high temperature superconductor.
Level 1: To measure the transition temperature.
Level 2: To determine the resistivity of a high temperature superconductor.

Experiment No. 14: Plotting I-V characteristics in forward and reverse bias for LEDs and Determination of knee voltage.
Level 1: Plotting I-V characteristics in forward and reverse bias for LEDs
Level 2: Determination of knee voltage.

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Experiment No. 15: Determination of Stefan's constant and verification of Stefan-Boltzmann Law.
Level 1: Determination of Stefan's constant
Level 2: Verification of Stefan-Boltzmann Law.

Targeted Application & Tools that can be used:

1. Areas of application are optoelectronics industry, Solar panel technologies, quantum computing software, electronic devices using transistors and diodes, memory devices, endoscopy, SQUIDS in MRI, Advanced material characterizations using SEM and STM.
2. Origin, excel and Mat lab soft wares for programming and data analysis.

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course

Assessment Type

- Midterm exam
- Assignment (review of digital/ e-resource from PU link given in references section - mandatory to submit screen shot accessing digital resource.)
- Quiz
- End Term Exam
- Self-Learning

1. Prepare a comprehensive report on non-conventional energy resources in Karnataka and their pros and cons.
2. Write a report on importance of quantum entanglement in supercomputers.

Text Book

1. Engineering Physics by Avadhanalu, Revised edition, S. Chand Publications,2018.

References:

1. Elementary Solid state Physics: Principles and Applications by M.A. Omar, 1st Edition, Pearson Publications, 2002.
2. Principles of Quantum Mechanics by R Shankar, 2nd edition, springer Publications, 2011.
3. Optoelectronics: An Introduction by John Wilson and John Hawkes, 3rd edition, Pearson Publications, 2017.
4. Engineering Physics by Gaur and Gupta, Dhanpat Rai Publications, 2012.
5. Introduction to Quantum Mechanics, David J Griffiths, Cambridge University Press, 2019

E-Resourses:

1. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=553045&site=ehost-live
2. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=833068&site=ehost-live
3. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=323988&site=ehost-live
4. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1530910&site=ehost-live
5. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=486032&site=ehost-live

Topics relevant to development of "FOUNDATION SKILLS": Fundamentals of materials, Lasers and optical fibers.

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Topics relevant to "HUMAN VALUES &PROFESSIONAL ETHICS": **Emphasizes team work, self-learning and professional development.**	
Catalogue prepared by	Dr. Sivasankar Reddy, Dr. Naveen C S, Dr. Anindita Bose, Dr. Bharathi D, Dr. Mohan kumar Naidu, Dr. Deepthi P R, Dr. Mahaboob Pasha, Dr. Ranjeth Kumar Reddy, Dr. Harish Sharma Akkera, Dr. Pradeep Bhaskar, Dr. G. Srinivas Reddy.
Recommended by the Board of Studies on	7th BOS Meeting Held on 25th July 2022
Date of Approval by the Academic Council	Mention the Academic Council Meeting No. & the date of the meeting:

3. Essentials of Physics PHY 1009

Course Code: **PHY 1009**	**Course Title:** **Essentials of Physics** **Type of Course:** **1] School Core**	**L-P-C**	2	0	2
Version No.	1.0				
Course Pre-requisites	The course has no pre-requisites but knowledge of high school level Physics and Mathematics will be advantageous.				
Anti-requisites	**NIL**				
Course Description	**Purpose:** To provide an understanding of fundamental concepts and terminologies of Physics encountered in everyday life which would prove essential for animators and design students. **Abilities to be developed:** The students will be able to estimate the result of various forces acting on a body and use the basic concepts and laws that govern the response of objects to their surroundings. They will be encouraged to apply their knowledge to predict the changes produced due to an action on an object. **Nature of the course:** The course is both conceptual and analytical in nature. The concepts will be taught using both digital and non-digital tools and the students encouraged to demonstrate understanding of the concepts by representing them visually using any media of their choice.				
Course Outcomes	On successful completion of the course the students shall be able to: 1] Define the basic terminology used Physics 2] Describe the laws of motion, forces and energy				

	3] Determine the influence of external environment on the behavior and response of an object.			
Course Objective	The course is designed to improve the learners EMPLOYABILITY SKILLS by using EXPERIENTIAL LEARNING techniques.			
Course Content:				
Module 1	Motion	Assignment	Illustrations Visual media	**8 Hours**
Topics: 1. Definition of commonly used terminology such as scalar, vector, mass, weight, speed, velocity, acceleration, centre of gravity, etc. as applied in real life situations. 2. Various units of measurement and conversion of units into digital environment (timing and spacing). 3. Resolution of vectors and calculation of resultant vectors for application in motion of a body. 4. Equations of motion and its application to the motion of a ball under different conditions.				
Module 2	Newton's laws	Assignment Test	Illustrations Visual media	**12 Hours**
Topics: 1. Newton's laws of motion 2. Examples of contact (collision, normal reaction, friction, buoyancy, etc.) and non-contact (gravitational) forces 3. Momentum and collisions 4. Difference between sustained forces and impulses.				
Module 3	Energy	Assignment	Illustrations Visual media	**6 Hours**
Topics: 1. Work, energy, power and their relation to forces. 2. Potential, kinetic and other types of energies. 3. Principle of levers and pulleys. 4. Conservation of energy.				
Module 4	~~Oscillatory motion~~ Thermodynamics Stability and streamlining	Assignment Test	Illustrations Visual media	**4 Hours**
Topics:				

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1. **Stability of bodies at rest (increasing stability of designed objects, reducing local stresses)**
2. **Design elements for stiffness, trusses, composite material applications (using less material for same strength)**
3. **Streamlining (reducing drag forces)**
4. **Ergonomics (pressure points reduced with respect to human requirements)**

~~5. Definition of commonly used terms in oscillatory motion such as frequency, amplitude, time period, etc.~~

~~6. Conservation of energy applied to a pendulum and spring.~~

7. ~~Damping of oscillations~~.

Targeted Application & Tools that can be used:

1. Microsoft Excel (or other media tools)

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course

Assessment Type

- Midterm exam
- Assignment (review of digital/ e-resource from PU link given in references section - mandatory to submit screen shot accessing digital resource.)
- Quiz
- End Term Exam
- Self-Learning

The students shall be required to demonstrate the concepts of Physics taught in this course using any digital application or software.

Text Books

1. R. Resnick, J. Walker, D.Halliday, 'Fundamentals of Physics', Wiley Publications.

References

1. M.N. Avadhanulu, P.G. Kshirsagar, 'Textbook of Engineering Physics', S. Chand Publications.
2. P.A. Tipler, 'Physics', Vol 1, CBS Publications.
3. www.algarcia.org

E-Resources:

1. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=239300&site=ehost-live

2. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=2725216&site=ehost-live

3. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=2107717&site=ehost-live

Catalogue prepared by	Dr. Pradeep Bhaskar Dr. Mohan Kumar Naidu P.

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Recommended by the Board of Studies on	7th BOS conducted on 25th July, 2022
Date of Approval by the Academic Council	

Open Electives

Mechanics and Physics of Materials PHY1003

Course Code: **PHY 1003**	**Course Title: Mechanics and Physics of Materials** **Elective**	L-P-C	2	0	2
Version No.	1.0				
Course Pre-requisites					
Anti-requisites	**NIL**				
Course Description	Oscillations and waves are very important field of science needed for engineer. The course helps engineers to understand the concepts involving oscillations and waves. The course deals with central concepts of elastic properties of materials and their behavior that lay solid foundation to understand the applications of these materials in engineering domain.				
Course Out Comes	On successful completion of the course the students shall be able to: CO1: Understand the concepts of oscillations to solve engineering problems. CO2: Utilize the concept of waves in engineering applications. CO3: Understand the elastic properties of materials to use them in various engineering applications.				
Course Objective	The course is designed to improve the learners EMPLOYABILITY SKILLS by using EXPERIENTIAL LEARNING techniques.				
Course content					
Module 1	**Oscillations**	Assignment		**No. of Classes: 08**	
Topics: Differential equation of SHM and its solutions, Simple and compound pendulum; oscillations of two masses connected by a spring; damped oscillations – over damped, under damped and un-damped oscillations;					

~~forced oscillations - concept of resonance; Coupled Oscillators - in phase and out of phase oscillations- energy transfer~~				
Module 2	**Waves**	Assignment		**No. of Classes: 4**
Topics: Wave Equation, Speed of transverse waves on a uniform string; Speed of longitudinal waves in a fluid; Group velocity and Phase velocity – relation between them.				
Module 3	**Elasticity**	Term paper		**No. of classes: 8**
Topics: Hooke's law, Stress – Strain diagram, definitions of three elastic moduli; Relationship between three elastic constants (derivation); Poisson's ratio; Work done in stretching a wire; Bending of beams; Bending moment, Theory of single cantilever, Couple per unit twist, Torsional oscillations				
Targeted Application & Tools that can be used:				
Project work/Assignment: Mention the Type of Project /Assignment proposed for this course				
Assessment Type • Midterm exam • Assignment (review of digital/ e-resource from PU link given in references section - mandatory to submit screen shot accessing digital resource.) • Quiz • End Term Exam • ~~Self-Learning~~ 1. Prepare a comprehensive report on elastic properties of various metals and alloys. 2. Write a report on importance of in engineering applications.				
Text Book 2. Engineering Physics, Avadhanalu, S. Chand Publications. 3. Engineering Physics, Gaur and Gupta, Dhanpat Rai Publications.				
References: 1. Elementary Solid state Physics: Principles and Applications: M.A. Omar, Pearson Publications. 2. Principles of Quantum Mechanics: R Shankar, Plenum Press Publications.				
e-resource: **1. https://puniversity.informaticsglobal.com:2282/ehost/resultsadvanced?vid=6&sid=82b68dd8-e350-4d10-b006-fab78d99541c%40redis&bquery=mechanics+of+materials&bdata=JmRiPWlpaCZkYj1ubGViayZ0eXBlPTEmc2VhcmNoTW9kZT1TdGFuZGFyZCZzaXRlPWVob3N0LWxpdmU%3d** **2. https://puniversity.informaticsglobal.com:2282/ehost/detail/detail?vid=7&sid=82b68dd8-e350-4d10-b006-fab78d99541c%40redis&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=553095&db=nlebk** **3. https://puniversity.informaticsglobal.com:2282/ehost/detail/detail?vid=8&sid=82b68dd8-e350-4d10-b006-fab78d99541c%40redis&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=517088&db=nlebk** **4. https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=EBOOKDIRECTORY_1_3524** **5. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=607804&site=ehost-live**				
Catalogue prepared by	Dr. Sivasankar Reddy			

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Recommended by the Board of Studies on	7th BOS conducted on 25th July, 2022
Date of Approval by the Academic Council	Mention the Academic Council Meeting No. & the date of the meeting:

Astronomy PHY1004

Course Code:	**Course Title:** Astronomy **Type of Course: 1] School Core** **2] Laboratory integrated**	**L-P-C** **2- 0-2**			
Version No.	1.0				
Course Pre-requisites	**NIL**				
Anti-requisites	**NIL**				
Course Description	Astronomy is a natural science that deals with the study of celestial objects and phenomena that originate outside the atmosphere of Earth. The course is going to introduce some amazing things from icy rings of Saturn to monster black holes. The course helps to expand the knowledge of astronomy, from recognizing the moon and a few stars in the evening sky, to a deeper understanding of the diversity of the universe. This theory course develops an attitude of enquiry. It also develops team working and report writing skills through project work and assignments.				
Course Out Comes	On successful completion of the course the students shall be able to: CO1: Describe the features of objects in the Solar System (i.e. Sun, planets, moons, asteroids, comets, etc.) giving details of similarities and differences between these objects; CO2: Explain stellar evolution, including red giants, supernovas, neutron stars, pulsars, white dwarfs and black holes, using evidence and presently accepted theories; CO3: Explain the evolution of the expanding Universe using concepts of the Big Bang and observational evidence				
Course Objective	The course is designed to improve the learners EMPLOYABILITY SKILLS by using EXPERIENTIAL LEARNING techniques.				
Course Content:					

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Module 1	**The Sky**	Assignment:	Report Writing: The sun is almost 400 times farther from Earth than is the moon. How Long does light from the moon take to reach Earth?	**No. of Classes: 10**
The sky and its motion, Cycles of the sky. The origin of modern astronomy, Light and telescopes: Radiation information from space, optical telescopes, Special instruments, Radio telescopes, Astronomy from space. ~~Atoms and starlight: Atoms, the interaction of light and matter, information from spectra.~~				
Module 2	**Solar system and stars**	Assignment:	Data collection: How do Newton's laws lead you to conclude that gravitation has to be Universal?	**No. of Classes: 10**
The solar system: An overview, terrestrial planets, Jovian planets, Pluto and the Kuiper belt. Meteorites, asteroids and comets. The Stars: The sun, family of stars, formation and structure of stars, death of stars. Neutron stars and Black holes.				
Module 3	The Universe of Galaxies	Assignment:	Data Collection: What evidence shows that the universe is expanding? What evidence shows that it began with a big bang?	**No. of Classes: 10**
The Milky Way Galaxy, Galaxies. Active galaxies and supermassive black holes, Modern Cosmology: Introduction to the universe, the big bang theory, Space, time, matter and energy, 21st century cosmology.				

Assignment: Mention the Type Assignment proposed for this course

Assessment Type

- Midterm exam
- Assignment (review of digital/ e-resource from PU link given in references section - mandatory to submit screen shot accessing digital resource.)
- Quiz
- End Term Exam
- Self-Learning

1. What is the difference between our solar system, our galaxy, and the universe?
2. If earth is about 4.6 billion years old, how many precessional cycles have occurred?
3. Why would you not plot sound waves in the electromagnetic spectrum?

Text Book

1. Hawking on the big bang and Black holes by Stephen Hawking.
2. The new Cosmos-An introduction to Astronomy and Astrophysics. A Unsold and B. Baschek, 5th Edition, Springer.

References: 1. College Physics- Physics and Astronomy, open stax college, Rice university.

REGISTRAR

2. Electronic imaging in Astronomy Detectors and Instrumentation by Ian S McLean, Second Edition, Springer.
e-resource: **1. https://puniversity.informaticsglobal.com:2282/ehost/detail/detail?vid=10&sid=82b68dd8-e350-4d10-b006-fab78d99541c%40redis&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=464762&db=nlebk** **2. https://puniversity.informaticsglobal.com:2282/ehost/detail/detail?vid=11&sid=82b68dd8-e350-4d10-b006-fab78d99541c%40redis&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=408890&db=nlebk** **3. https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=SPRINGER4_2889** **4. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=174546&site=ehost-live** **5. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=206853&site=ehost-live**
Topics relevant to development of "FOUNDATION SKILLS how gravity is related to the formation, interaction, and evolution of the solar system, stars, galaxies, and the universe **Topics relevant to "HUMAN VALUES &PROFESSIONAL ETHICS": Team work, leadership skills**

Catalogue prepared by	Dr. Deepthi, Dr. Bharathi D
Recommended by the Board of Studies on	7th BOS conducted on 25th July, 2022
Date of Approval by the Academic Council	Mention the Academic Council Meeting No. & the date of the meeting:

3. Game Physics PHY1005

Course Code: PHY1005	**Course Title: Game Physics** **Type of Course:1] Open Elective** **2] Laboratory integrated**	**L- P- C**	2	2	3
Version No.	1.0				
Course Pre-requisites	**(Prior knowledge of physics and python programming is desirable but not mandatory). Knowledge of Python programming is desirable and basic knowledge of basic Physics concepts is desirable but not mandatory. Any familiarity with the topics will be useful for deeper application of concepts taught.**				
Anti-requisites	**NIL**				
Course Description	This course is a hands on experience of applying concepts in physics to a virtual environment. It demonstrates the important part of physics in computer based games and virtual reality environments. Many games like GTA (Grand Theft Auto), Oblivion, Half-Life, Crackdown, among others use principles of physics in real world to make the games more realistic. The course is both conceptual and analytical in nature while				

	developing critical thinking and analytical skills. The course also enhances the programming abilities through assignments. The course will give an experience in modifying computer programs to obtain the desired results. The ability to think out of the box, confidence in facing new issues and self-learning will be encouraged through various assignments. Students will be using Python and IDLE/Jupyter installed in computer lab or on own laptops during this course.
Course Objective	The course is designed to improve the learners EMPLOYABILITY SKILLS by using EXPERIENTIAL LEARNING techniques.
Course Out Comes	On successful completion of the course the students shall be able to: 1] Identify various physics concepts applied in computer games and virtual reality environments. 2] Convert Physics concepts into mathematical language. 3] Model simplified real life physics phenomenon in a computer programing language 4] Collate parts of pre-written code to produce a working program which includes applied concepts of physics.
Course Objective	The course is designed to improve the learners EMPLOYABILITY SKILLS by using EXPERIENTIAL LEARNING techniques.
Course Content:	[1] For Theory Component: Represent the course contents in the form of different modules each module having similar topics in the sequential pattern such that the topics are arranged from "KNOWN TO UNKNOWN, SIMPLE TO COMPLEX. Generally, a 2 Credit course must have 3 modules, 3 Credit course must have 5to 6modules and The content must have a component of programming/Coding exercise relevant to the appropriate topic in the content. Content must mention a few target applications the course] and the associated software/ hardware tools, Mention the assignment status in each of the module and also mention the nature of assignment [Coding/ simulation] 2] For Laboratory Component: Mention the List of tasks proposed to be conducted indicating at least 2 different levels of experiment for each of the task [Where ever possible]

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Module 1	Kinetics and Kinematics	Assignment	Programming/Simulation	**No. of Classes: 8**
Topics: Fundamental topics in Newtonian mechanics such as center of mass, Newton's laws, inertia, linear and angular velocity and acceleration, momentum and general motion in two and three dimensions. Simulating the topics in mathematical and programing language.				
Module 2	Forces and Energy	Assignment	Programming/Simulation	**No. of Classes: 6**
Topics: Force and torque including drag forces, force fields, and pressure. Conservation of energy applied in collisions and projectile motion. Simulating the topics in mathematical and programing language.				
Module 3	Numerical Integrators and simple operations	Assignment	Programming/Simulation	**No. of Classes: 6**
Topics: Euler's method and Runge-kutta method of calculating integrals. Vector and matrix operations. Implementing the methods in programing language.				
Module 4	~~Particles and rigid bodies.~~ Application of Python in Physics Simulation	Term paper	Programming/Simulation	**No. of Classes: 10**
Topics: ~~Rigid body dynamics and simulation of particles, rigid bodies and connected rigid bodies. Programing a simple particle model, rigid body model and tuning with project.~~ Use of Matplotlib for ploting, Aerofoil, pendulum motion, Pymunk concepts and applications.				
List of Laboratory Tasks: Experiment No. 1: Test your coding skills Level 1: distribute 10 particles randomly on a chess board/square Level 2: make the particles a) look like circles b) move every two seconds Experiment No. 2: Center of mass and moment of inertia Level 1: Display the changing center of mass a when particles randomly move every two seconds Level 2: Display the changing moment of inertia around the center of mass every two seconds Experiment No. 3: Velocity and acceleration Level 1: show a particle moving towards a wall at a) constant velocity and b) with acceleration Level 2: When it reaches the wall show that it returns with a) constant velocity b) with deceleration				

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Experiment No. 4: Projectile motion
Level 1: Plot the path of a projectile with and without gravity
Level 2: Show a moving projectile launched from different heights and different angles

Experiment No. 5: Algodoo project
Level 1: Use the Algodoo physics engine and software to display a car moving at constant velocity
Level 2: Create a upward and downward slope after the car travels for a short distance

Experiment No. 6: Explosion
Level 1: Create an explosion of kinematic particles
Level 2: When the particles reach the edge of the frame they bounce back

Experiment No. 7: Rotation motion
Level 1: Use the Algodoo physics engine to demonstrate rotational motion and moment of inertia
Level 2: Create a small game using Algodoo engine

Experiment No. 8: Understanding a program (simplest particle diffusion model)
Level 1: Write comments in the code explaining the logic
Level 2: Tune the code to make a) colour change with distance b) 2D instead of 3D.

Experiment No. 9: Understanding a program (N-body gravity model)
Level 1: Write comments in the code explaining the logic
Level 2: Tune the code to make a) create bodies with different size and mass

Experiment No. 10: Euler's method
Level 1: write a program to calculate result of a function using Euler's method
Level 2: write a program using modified Euler's method

Experiment No. 11: Runge-kutta (RK4) method
Level 1: write a program implementing Runge kutta (RK4) method
Level 2: calculate orbits in a gravity potential

Experiment No. 12: Matplotlib sample program
Level 1: Demonstrate the basics of Matplotlib for line graph, bar chart, scatter plot.
Level 2: Students modify data to display plots and change the appearance.

Experiment No. 13: Pymunk
Level 1: Installation and demonstration of Pymunk
Level 2: Complete simple program using Pymunk

Targeted Application & Tools that can be used:
Python using Jupyter environment, Algodoo physics engine

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course

Assessment Type

- Midterm exam

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- Assignment (review of digital/ e-resource from PU link given in references section - mandatory to submit screen shot accessing digital resource.)
- Quiz
- End Term Exam
- Self-Learning

Make a simulation of the solar system using Pygame.

Text Book

D.M. Bourg, B. Bywalec, 'Physics for Game Developers' O'Reilly Publications, 2nd Ed., 2013.

References

1. Jesse M. Kinder and Philip Nelson, 'A Student's Guide to Python for Physical Modeling', Princeton University Press, 2015.
2. University Physics Volumes 1 and 2 (OpenStax, 2016), https://openstax.org/details/books/university-physics-volume-1 https://openstax.org/details/books/university-physics-volume-2.
3. J.P. Mueller, Beginning Programming with Python for Dummies, Wiley Publications, 2017

E-resources:

1. https://presiuniv.knimbus.com/user#/searchresult?searchId=game%20physics&curPage=0&layout=list&sortFieldId=none&topresult=false
1. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1587478&site=ehost-live
2. https://search.ebscohost.com/login.aspx?direct=true&db=iih&AN=60147826&site=ehost-live
3. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1587478&site=ehost-live

Topics relevant to development of "FOUNDATION SKILLS":

Applying concepts of Physics in computer programs.

Topics relevant to " HUMAN VALUES &PROFESSIONAL ETHICS":

Team working skills, self learning

Catalogue prepared by	Dr. Pradeep Bhaskar Dr. Deepthi P.R. Dr. Srinivas G
Recommended by the Board of Studies on	7th BOS conducted on 25th July, 2022
Date of Approval by the Academic Council	Mention the Academic Council Meeting No. & the date of the meeting:

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4. Statistical Mechanics PHY1006

Course Code: PHY1006	**Course Title: Statistical Mechanics** **Type of Course: Open Elective**	**L- P- C 2-0-2**	2	0	2
Version No.	1.0				
Course Pre-requisites	**Class 11 and 12th Physics and Mathematics Knowledge**				
Anti-requisites	**NIL.**				
Course Description	The course helps to develop the concept of Statistical Mechanics and its applications. It develops concept in basic probability, statistical interpretation of thermodynamics, micro canonical, canonical and grand canonical ensembles. It provides the understanding of quantum and classical statistical mechanics. Different statistical system like Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein are discussed in detail and their applications in physics and technical fields are explained.				
Course Out Comes	On successful completion of the course the students shall be able to: 1] Discuss the concepts of microstate and macro state of a model system and explain the relation between thermodynamics and statistical mechanics. 2] Distinguish between different statistical distribution models. 3] Apply the concept of statistical distributions to explain different physical phenomenon. 4] Apply different statistical models for calculations in practical scenarios.				
Course Objective	The course is designed to improve the learners EMPLOYABILITY SKILLS by using EXPERIENTIAL LEARNING techniques.				
Course content					
Module 1	Fundamentals of Statistical Mechanics	Assignment	Plotting of density of states v/s energy for copper metal using excel/ origin software.		**No. of classes: 10**
Topics: Connection between statistics and thermodynamics, Basic probability concepts, Classical ideal gas, entropy of mixing and Gibbs paradox. Micro-canonical ensemble, phase space, trajectories and density of states, Lioville theorem, canonical and grand canonical ensembles, partition function, ~~calculation of~~					

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~~statistical quantities, energy and density fluctuations,~~ Probability Theory: Probability densities,cumulants and coreations, Central limit theorem				
Module 2	Distribution functions	Assignment	Seminar on Bose-Einstein condensation and superfluidity	**No. of classes: 10**
Topics: Density matrix, statistics of ensembles, statistics of indistinguishable particles, Maxwell-Boltzman, Fermi-Dirac and Bose-Einstein statistics, properties of ideal Bose and Fermi gases, Bose-Einstein condensation.				
Module 3	Fluctuations and dissipations	Term Paper	Report writing on Brownian Motion And Its Applications In The Stock Market.	**No. of classes: 10**
Topics: Landau theory of phase transition, critical indices, scale transformation and dimensional analysis. Correlation of space-time dependent fluctuations, fluctuations and transport phenomena, Brownian motion, Langevin theory, fluctuation-dissipation theorem				

Targeted Application & Tools that can be used:

1. Areas of application are Econophysics and stock market
2. Origin, excel and Mat lab soft wares for programming and data analysis

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course

Assessment Type

- Midterm exam
- Assignment (review of digital/ e-resource from PU link given in references section - mandatory to submit screen shot accessing digital resource.)
- Quiz
- End Term Exam
- Self-Learning

Prepare a comprehensive report on application of statistical mechanics in economics.

Text Book

Fundamentals of Statistical and thermal physics By F. Reif.

References

1. Statistical Mechanics, By K Huang.
2. Statistical Mechanics, By R K Patharia.

E-Resources:

1. https://presiuniv.knimbus.com/user#/viewDetail?searchResultType=ECATALOGUE_BASED&unique_id=BOOKYARDS_1_15518
2. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=2706837&site=ehost-live
3. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=312238&site=ehost-live

Catalogue prepared by	Dr. Naveen C S and Dr. Anindita B

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Recommended by the Board of Studies on	7th BOS conducted on 25th July, 2022
Date of Approval by the Academic Council	

5. Physics of Nanomaterials PHY1007

Course Code: PHY1007	**Course Title:** **Physics of Nanomaterials** **Type of Course:** **1] Open elective**	**L-P-C**	3	0	3
Version No.	1.0				
Course Pre-requisites	**NIL**				
Anti-requisites	**NIL**				
Course Description	The course is designed to introduce the emerging area of nanotechnology that has the potential to revolutionize techniques by which materials and products will be created in the future with new and superior properties and functionalities. Nanomaterials refers to the world as it works on the nanometer scale from below a nanometer to a few hundred nanometers. The synthesis and control of nanomaterials will involve so-called "bottom up" strategies of self-assembly starting with the smallest possible entities, such as atoms and molecules, much in the same way as synthesis is conducted in natural biological systems. Some "top down" mechanical methods will also be discussed. The course will start with fundamental concepts and then proceed to nanoscale phenomena and properties. This will be followed by discussions on the synthesis and properties of nanomaterials. Emerging and potential applications of nanomaterials will be considered in the final section of the course.				
Course Out Comes	On successful completion of the course the students shall be able to: 1] Describe how the nanoparticle size can affect the properties of nanomaterials. 2] Describe the several synthesis methods for fabrication of nanomateials, 3] Analyze the importance of nanomaterial properties for a wide range of engineering applications.				

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Course Objective	The course is designed to improve the learners EMPLOYABILITY SKILLS by using EXPERIENTIAL LEARNING techniques.			
Course Content:				
Module 1	Introduction to nanomaterials:	Assignment	Plotting of surface to volume ratio with the size of the particle using excel/ origin software	**No. of classes: 9**
Topics: Basic principles of nanomaterials, role of size in nanomaterials, types of nanomaterials: 1-D, 2-D and 3-D nanostructured materials, Quantum dots, Quantum wires, Quantum core/shell structures				
Module 2	Synthesis of Nanomaterials	Assignment	Report writing on the advantages of chemical methods for the preparation of nanoparticles.	**No. of classes: 10**
Topics: Top down and bottom up approaches, solid state reaction method, Chemical Vapor Deposition, Sol-gels techniques, Electrodeposition, Ball Milling, ~~Introduction to lithography,~~ pulse laser deposition (PLD) and Sputtering.				
Module 3	Properties of Nanomaterials	Term paper	Seminar on magnetic materials.	**No. of classes: 10**
Topics: Chemical properties: Reactivity; Catalysis, ~~Thermal property: Melting point temperature,~~ Electronic properties: Electrical conduction, Optical properties: Absorption and scattering of light, Magnetic properties: Magnetization.				
Module 4	Applications of Nanomaterials	Term paper	Case study on medical applications of nanomaterials	**No. of classes: 9**

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Topics: Application of nanomaterials : Manufacturing industry, Electrical and communication industry ~~Nanomachines, Nanodevices, Quantum electronic devices, Quantum computers, CNT based transistor and field emission display,~~ environmental and biological applications.

Targeted Application & Tools that can be used:

4. Area of application is nanotechnology industry.
5. Origin, excel and Mat lab soft wares for programming and data analysis

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course

Assessment Type

- Midterm exam
- Assignment (review of digital/ e-resource from PU link given in references section - mandatory to submit screen shot accessing digital resource.)
- Quiz
- End Term Exam
- Self-Learning

1. Write a report on structural characterizations of nanomaterials.

Text Book

Nanotechnology-Basic Science and Emerging Technologies Mick Wilson, Kamali Kannangra Geoff Smith, Michelle Simons and Burkhard Raguse, Overseas Press

References:

Nanoscale materials science, Kenneth J. Klabunde (Eds), John Wiley & Sons, InC, 2001

E-Resources:

1. https://presiuniv.knimbus.com/user#/searchresult?searchId=Physics%20of%20nanomaterials&_t=1657686989559
2. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1888270&site=ehost-live
3. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1924968&site=ehost-live

Topics relevant to development of "FOUNDATION SKILLS": **Elastic, thermal and mechanical properties of materials.**

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Topics relevant to "HUMAN VALUES &PROFESSIONAL ETHICS": **Emphasizes team work, self-learning and professional development.**	
Catalogue prepared by	Dr. G. Srinivas Reddy, Dr. Harish Sharma A, Dr. Anindita Bose, Dr. Naveen C S
Recommended by the Board of Studies on	7th BOS conducted on 25th July, 2022
Date of Approval by the Academic Council	Mention the Academic Council Meeting No. & the date of the meeting:

6. Adventures in nanoworld PHY1008

Course Code:	**Course Title:** **Adventures of Nanoworld** **Type of Course:** **Open Elective & Theory only**	**L- P- C**	3	0	3
Version No.	1.0				
Course Pre-requisites	**NIL**				
Anti-requisites	**NIL**				
Course Description	The course will provide a comprehensive introduction to the rapidly developing field of Nanoscience and Nanotechnology. The course is envisioned to provide a guide to the ideas and physical concepts that allow an understanding of the changes that occur as the size scale shrinks toward the atomic scale. Because the field is extremely interdisciplinary, the course will mainly introduce many pervasive concepts such as how to measure on the nanometer scale. A critical theme is the modification of properties by controlling electrons.				
Course Outcomes	On successful completion of this course the students shall be able to: 1) Distinguish between bulk material and nanomaterial. 2) Explain different characterization techniques for nanomaterials. 3) Demonstrate how the applications of nanotechnology will influence science of tomorrow and will change many sides of our life.				

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Course Objective	The course is designed to improve the learners EMPLOYABILITY SKILLS by using EXPERIENTIAL LEARNING techniques.			
Course Content:				
Module 1	Basic Concepts of Nanoscience and Nanotechnology	Assignment	Visit to the research lab	**15 Classes**
Topics: Introduction-difference between nano material and bulk material, Scientific Revolution - Feynman's Vision – Nanoscience – Nanotechnology - Nanomaterials definitions - Classification of Nanomaterials - dimensions-confinement - Surface to volume ratio - Energy at bulk and nano scale, Quantum Confinement Effects – Classifications of Nano systems - 1D- 2D- 3D Nanomaterials – Size Dependent Properties of Nanomaterials. Synthesis: Top-down and Bottom-up approach – Temperature effects –Grain Growth – Grain boundary segregation and pinning – Aggregation.				
Module 2	Characterization Techniques of Nanomaterials	Case Study	Use characterization equipment results to infer properties	**15 Classes**
Topics: Characterization of electrical- optical- mechanical and magnetic properties of nanomaterials, optical tweezers, electrical conductivity and permittivity- magnetic permeability- Structural characterization: X-ray diffraction- Electron microscopy. Surface characterization: scanning electron microscopy- atomic force microscopy- Tunnelling electron microscopy- XPS.				

Module 3	~~Applications~~ Recent Advances in Nanoscience	Term exam	Case study on applications of nanomaterials	**15 Classes**
Topics: ~~Energy storage devices – Quantum computers – Antioxidants – Polymer electronics – Environmental protection – Food processing & packaging – Agrotechnology – Nanosensors, lab on a chip– Biosystems – Drug delivery – Tissue engineering – Nanorobots – Cell tracking & labeling – Molecular motors – Cosmetics. Sprintronics -Principles of spintronics-- Spin based optoelectronic and memory devices- applications~~ Health: pharmaceutical industry; Agriculture: Crop Protection and Livestock Productivity; Water Treatment: Safe Purification; Diseases: Early Detection; Solar Power.				

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Targeted Application & Tools that can be used:

1. Analyze X-ray diffraction data to estimate properties of the material.

Project work/Assignment:

Assessment Type

- Midterm exam
- Assignment (review of digital/ e-resource from PU link given in references section - mandatory to submit screen shot accessing digital resource.)
- Quiz
- End Term Exam
- Self-Learning

Assignment 1: Synthesize known nanomaterial by hydrothermal method.

Assignment 2: Particle size calculation using PXRD.

Text Book:

1. Springer Handbook of Nanotechnology- Ed. by B. Bhushan, Springer-Verlag (2004)
2. The Chemistry of Nanomaterials: Synthesis, Properties and Applications, C.N.R. Rao, A. Muller, A. K. Cheetham (Eds), Wiley-VCH Verlag (2004)

References

1. Nanotechnology: The opensource handbook of nanotechnology and nanoscience, Wikibooks, 2020. Nanotechnology - Wikibooks, open books for an open world
2. Charles P. Poole Jr, Frank J. Owens, Introduction to Nanotechnology, ISBN:0471079359. Wiley Publications, 2003

E-Resources:

1. **https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=123503&site=ehost-live**
2. **https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1832368&site=ehost-live**
3. **https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=305266&site=ehost-live**

Topics relevant to development of "FOUNDATION SKILLS":
Characterization of electrical- optical- mechanical and magnetic properties of nanomaterials.

Topics relevant to "HUMAN VALUES &PROFESSIONAL ETHICS":
Continuous self-learning

Catalogue prepared by	Dr Deepthi P R Dr Pradeep Bhaskar
Recommended by the Board of Studies on	7th BOS conducted on 25th July, 2022

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Date of Approval by the Academic Council	

7. Waves and Mechanics PHY 1010

Course Code: PHY1010	**Course Title: Waves and Mechanics** **Type of Course:1] Discipline/Open Elective** **2] Theory Course**	**L- P- C**	3	0	3
Version No.	1.0				
Course Pre-requisites	**NIL – Knowledge undergraduate level Physics is desirable but not mandatory. Any familiarity with the topics will be useful for deeper application of concepts taught.**				
Anti-requisites	**NIL**				
Course Description	This course is designed to provide Computer Science students with basics of Physics that would be required in many of the career paths for computer science students. It includes the physics required for the major career paths such as gaming, AR/VR, real world simulation, Finite Element Analysis as well as concepts required for future quantum computers. The concepts taught include vectors, Newtonian physics, oscillatory motion, acoustics, electromagnetism, semiconductors and quantum physics, among others. The course will give an emphasis on practical representation of physics concepts in a logical/mathematical format which is suitable for numerical computing.				
Course Out Comes	On successful completion of the course the students shall be able to: 1] Apply vector and matrix concepts to resolve Newtonian Physics concepts 2] Demonstrate knowledge of wave equations, electrostatics. 3] Explain the working of semiconductor devices 4] Summarize fundamental concepts of quantum physics.				

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Course Objective	The course is designed to improve the learners EMPLOYABILITY SKILLS by using EXPERIENTIAL LEARNING techniques.			
Course Content:				
Module 1	Newtonian Physics	Assignment	Programming/Simulation	**No. of Classes:10**
Topics: Fundamental topics in Newtonian mechanics such as vectors, center of mass, Newton's laws, general motion in two and three dimensions, velocity, acceleration, momentum and rotational motion.				
Module 2	Waves	Assignment	Programming/Simulation	**No. of Classes:12**
Topics: Oscillations, spring motion, frequency and amplitude, energy conservation, waves in a string, energy transfer. Superposition and interference of waves, double slit interference, standing waves.				
Module 3	Electromagnetism and semiconductors	Assignment	Programming/Simulation	**No. of Classes: 10**
Topics: Electric fields, magnetic fields, force on current carrying wires, force on a moving charge, Hall effect, electromagnetic waves, Blackbody radiation, photoelectric effect. Classification of semiconductors, working of pn junctions, diodes and transistors, semiconductors in sensors.				
Module 4	Introduction to Quantum Physics	Term paper	Programming/Simulation	**No. of Classes:13**
Topics: Bohr atom and Hydrogen spectrum, deBroglie's hypothesis and its effects, uncertainty principle and its effects, wave and group velocity, Schrodinger's theory and its application, space quantization, electron spin, quantum bits, superposition, and entanglement.				
Targeted Application & Tools that can be used: Nil				
Project work/Assignment: Mention the Type of Project /Assignment proposed for this course				
GAssessment Type • Midterm exam • Assignment (review of digital/ e-resource from PU link given in references section - mandatory to submit screen shot accessing digital resource.) • Quiz • End Term Exam • Self-Learning **roup assignment on latest application and development in quantum computing**				
Text Book 1. Adams, 'Foundations of Physics', Mercury Learning & Information, 2019.				

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References 1. Narciso Garcia, Arthur Damask, Steven Schwarz, 'Physics for Computer Science Students', Springer Verlag, 1998. 2. Tipler, Mosca, 'Physics for Scientists and Engineers', W.H.Freeman and co., 5th edition, 2003.
E-Resources: 1. https://search.ebscohost.com/login.aspx?direct=true&db=e000xww&AN=2725216&site=ehost-live 2. https://search.ebscohost.com/login.aspx?direct=true&db=e000xww&AN=2107717&site=ehost-live
Topics relevant to development of "FOUNDATION SKILLS": *Applying concepts of Physics.* Topics relevant to " HUMAN VALUES &PROFESSIONAL ETHICS": Team working skills, self-learning

Catalogue prepared by	Dr. Pradeep Bhaskar, Dr Mohan K
Recommended by the Board of Studies on	7th BOS conducted on 25th July, 2022
Date of Approval by the Academic Council	

8. Medical Physics PHY2001

Course Code:	**Course Title:** **Medical Physics** **Type of Course:** **Open Elective & Theory only**	**L- P- C**	3	0	3
Version No.	1.0				
Course Pre-requisites	**NIL**				
Anti-requisites	**NIL**				
Course Description	The aim of the medical physics course is to provide an opportunity for students to develop a basic knowledge on different applications of physics in medical field. and apply their skills to a research problem. **The course is both conceptual and analytical in nature and needs fair knowledge of Mathematical and computing. The course develops the critical**				

	thinking and analytical skills. The course also enhances the programming abilities through assignments.			
Course Outcomes	**On successful completion of this course the students shall be able to:** **1) Discuss important topics associated with medical applications of physics.** **2) Illustrate, how physics is applied to the problems of clinical measurement, diagnosis, patient management and biomedical research using various Medical Imaging Technique.** **3) Explain the use of ultrasonic waves in analyzing human body.**			
Course Objective	The course is designed to improve the learners EMPLOYABILITY SKILLS by using EXPERIENTIAL LEARNING techniques.			
Course Content:				
Module 1	~~LASERS : SURGICAL APPLICATIONS DIAGNOSIS AND THERAPY~~ Lasers and Spectroscopy	Assignment	Data Analysis task	**15 Classes**
Topics: **Basic concepts of Laser, Cancer surgery - liver surgery - stomach surgery - gynecological surgery – urological surgery - cardiac surgery- lasers in Ophthalmology – Dermatology and Dentistry – cosmetic surgery.** **Basic concepts Mass Spectroscopy, NMR and Gas Chromatography.** ~~**Trace elements detection - laser induced fluorescence studies - cancer diagnosis - photo radiation therapy of tumors - lasers in endoscopy – lasers in laparoscopy – lasers in trapping of cells and genetic engineering - bio simulation.**~~				
Module 2	ADVANCED X-RAY IMAGING SYSTEMS and MAGNETIC RESONANCE IMAGING	Case Study	Simulation and data analysis task	**15 Classes**
Topics:				

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X-ray film- Diagnostic applications of X-rays-Skeletal system-soft tissues-the Chest — mobile and dental xray machine-mammography- CT: Basic principle – Generation of CT – Helical CT – Single slice and Multi slice CT scan System– Image reconstruction – CT artifacts

~~**MR instrumentation — Image formation–Localisation of the signal - Factors influencing signal intensity-contrast and resolution - Types of magnets –super conductors– RF Transmitters – RF receivers – Gradiant coils – RF shielding – NMR, MR Spectroscopy FMRI – MR Artifacts – safety aspects in MRI.**~~

Module 3	DIAGNOSTIC ULTRASOUND	Assignment	Data Collection and Analysis	**15 Classes**

Topics:

Ultrasonic waves - Beam characteristics –- attenuation of ultrasound – Specific acoustic impedance - reflection at body Interfaces-Coupling medium- Interaction ultrasound with tissues - Resolution –axial and lateral resolution - Artifacts-Pulse Echo Imaging-Obstetrics abdominal investigations Echo cardiograph (UCG) – The Doppler Effect-Doppler Shift continuous wave Doppler system-pulsed wave Doppler systems - duplex scanning - display devices for ultrasonic imaging.

Targeted Application & Tools that can be used:

Detect sound attenuation and distance to objects using Phyphox mobile app.
Apply python programs to graphically represent waves.

Project work/Assignment:

Assessment Type

- Midterm exam
- Assignment (review of digital/ e-resource from PU link given in references section - mandatory to submit screen shot accessing digital resource.)
- Quiz
- End Term Exam
- Self-Learning

Assignment 1: Detect heartbeat/pulse rate using audio recorder and python program.

Assignment 2: Prepare a compressive report on any one of the latest MRI equipment.

1. Ronald W. Waynant, Lasers in Medicine, CRC Press, 2010.

2 Jean A. Pope, Medical Physics: Imaging, Heinemann Publishers, 2012

3. Michiel Postema, Fundamentals of Medical Ultrasonics, Taylor & Francis, 2011

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References **1. D.R. Vij, K. Mahesh, Medical applications of lasers, Springer, 2002** **2. The Essential Physics for Medical Imaging – 2nd Edition –Jerrold T Bushberg, Lippincott Williams & Wilkins 2002.** **3. M. Hussey, Basic Physics and Technology of Medical Diagnostic Ultrasound, McMikkan, London 1990.**
E-Resources: **https://presiuniv.knimbus.com/user#/searchresult?searchId=Medical%20physics&_t=1657687654315** **1.** https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=564163&site=ehost-live **2. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=710703&site=ehost-live** **3. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1799208&site=ehost-live**
Topics relevant to development of "FOUNDATION SKILLS": **Basic medical equipment's and working, basic programming.** **Topics relevant to "HUMAN VALUES &PROFESSIONAL ETHICS":** **Communication skills**

Catalogue prepared by	Dr Deepthi P R Dr Pradeep Bhaskar
Recommended by the Board of Studies on	7th BOS conducted on 25th July, 2022
Date of Approval by the Academic Council	

9. Sensor Physics PHY2002

Course Code: PHY2002	**Course Title: Sensor Physics** **Type of Course: 1] Open Elective** **2] Laboratory integrated**	**L- P- C**	2	2	3
Version No.	1.0				
Course Pre-requisites	**Prior knowledge of physics or python or Arduino micro-controller is not required but any familiarity with the topics will be useful for deeper application of concepts taught.**				
Anti-requisites	**NIL**				
Course Description	The course will provide a working knowledge of the physics behind sensors used commonly for detecting temperature, weight, pollution, light, etc. The course will teach the parameters measured, its effect on a physical characteristics and the				

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	conversion of the physical change into electrical signals, which enable computerized measurement and detection. The hands-on component will ensure experience of using sensors, interfacing sensors with a micro-controller and thus view and act or respond to the measurements made by the sensors.
Course Out Comes	On successful completion of the course the students shall be able to: 1] Explain the fundamental working principles used in selected sensors 2] Analyze input from modern sensors and determine their working limits 3] Assemble and run basic sensor systems
Course Objective	The course is designed to improve the learners EMPLOYABILITY SKILLS by using EXPERIENTIAL LEARNING techniques.
Course Content:	

Module 1	Introduction to working with Arduino	Assignment	Programming	**No. of Hours: 8**
Topics: Introduction to python programing and demonstration on modifying code. Introduction to Arduino and its IDE. Introduction to transducers, LED and resistors. Introduction, types, classification and applications of sensors. Physics of temperature and proximity sensor.				
Module 2	Sensors	Assignment/Project	Programming	**No. of Hours: 10**
Topics: Physics of accelerometer, IR and PIR sensor, pressure and touch sensor, light and colour sensor, ultrasonic sensor, smoke and gas sensor, humidity and moisture sensor, Hall effect sensor, strain sensor, tilt sensor.				
Module 3	Developments in Sensor Technology	Assignment/Project	Programming	**No. of Hours: 12**
Topics: Cost reduction, miniaturization, intelligent materials, biomimetic materials, plug-and-play, embedding capabilities, and signal quality enhancements.				

List of Laboratory Tasks:

Experiment No 1: Starting with Arduino IDE and modifying code
Level 1: Turning inbuilt lights on and off in Arduino

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Level 2: Turning LED lights on and off in Arduino

Experiment No 2: Using bread board to control LED lights
Level 1: Turning LED lights on and off at different frequencies in Arduino
Level 2: Using push button to do the same experiment

Experiment No 3: Using IR sensor and PIRs
Level 1: Glow LED on detecting object using IR sensor
Level 2: How do black objects effect IR sensor? What is difference between IR and PIR sensor?

Experiment No 4: Using pressure sensor and touch sensors
Level 1: Obtain the measurement readings.
Level 2: What are the limits of the sensors?

Experiment No 5: Using light and colour sensors
Level 1: Obtain the measurement readings.
Level 2: What are the limits of the sensors?

Experiment No 6: Using ultrasonic sensor
Level 1: Obtain the measurement readings.
Level 2: Estimate distance to an object.

Experiment No 7: Using gas/smoke and humidity sensors
Level 1: Obtain the measurement readings.
Level 2: What are the limits of the sensors?

Experiment No 8: Use moisture sensor
Level 1: Obtain the measurement readings.
Level 2: Run motor if moisture sensor indicates low moisture

Experiment No 9: Use Hall effect sensor
Level 1: Obtain the measurement readings
Level 2: Count the number of coins and move motor for one min after one coin

Experiment No 10: Use Strain and weight sensor
Level 1: Turning red LED lights on if weight exceeds limit
Level 2: Plot weight vs measurement readings on a graph and find proportionality limits

Targeted Application & Tools that can be used:

1. Arduino Uno, Arduino IDE,
2. Python using IDLE

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course

Assessment Type

- Midterm exam

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- Assignment (review of digital/ e-resource from PU link given in references section - mandatory to submit screen shot accessing digital resource.)
- Quiz
- End Term Exam
- Self-Learning

1. **Open a miniature door to a room allowing a maximum of 10 people inside. The eleventh person is allowed inside only if one leaves the room.**

Text Book

1. **J.P. Mueller, Beginning Programming with Python for Dummies, Wiley Publications, 2017**

References **In references apart from the books and web links, mention a few standards &Hand books relevant to the Laboratory tasks used by the professionals.**

1. What is a Sensor? Different Types of Sensors, Applications (electronicshub.org)
2. Tutorials | Arduino
3. Different Types of Sensors and their Working (circuitdigest.com)

E-Resources:
https://presiuniv.knimbus.com/user#/searchresult?searchId=sensorl%20physics&curPage=0&layout=list&sortFieldId=none&topresult=false

1. **https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=792204&site=ehost-live**
2. **https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=601340&site=ehost-live**

Catalogue prepared by	Dr. Pradeep Bhaskar Dr. P. Mohan Kumar Naidu Dr. Deepthi P. R.
Recommended by the Board of Studies on	7th BOS conducted on 25th July, 2022
Date of Approval by the Academic Council	

10. Computational Physics PHY2003

Course Code: PHY 2003	**Course Title: Computational Physics** **Type of Course:1] Open Elective**	**L- P- C**	2	0	2
Version No.	1.0				

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Course Pre-requisites	**Knowledge of Physics and Mathematics till class 12**
Anti-requisites	**NIL**
Course Description	This course introduces logarithmic concepts and familiarizes students with the basic computational tools which are essential for graduate students in computational physics and related areas. In this course, students work toward mastering computational skills and this course aims to give the students competence in the methods and techniques of calculations using computers. At the end of the course the student is expected to have a hands on experience in modeling, algorithm development, implementation and calculation of physical quantities. It is designed for the students who wishes to broaden their knowledge of applications and develop techniques.
Course Out Comes	On successful completion of the course the students shall be able to: 1. Apply programming language to plot the graphical representation of a function 2. Apply interpolation techniques to estimate the result of a function 3. Solve partial differential equations using numerical computational techniques.
Course Objective	The course is designed to improve the learners EMPLOYABILITY SKILLS by using EXPERIENTIAL LEARNING techniques.
Course Content:	*[1] For Theory Component: Represent the course contents in the form of different modules each module having similar topics in the sequential pattern such that the topics are arranged from "KNOWN TO UNKNOWN, SIMPLE TO COMPLEX. Generally, a 2 Credit course must have 3 modules, 3 Credit course must have 5to 6modules and The content must have a component of programming/Coding exercise relevant to the appropriate topic in the content. Content must mention a few target applications the course] and the associated software/ hardware tools, Mention the assignment status in each of the module and also mention the nature of assignment [Coding/ simulation]* *2] For Laboratory Component: Mention the List of tasks proposed to be conducted indicating at least 2 different levels of experiment for each of the task [Where ever possible]*

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Module 1	Introduction to Python programming	Assignment	Programming/Simulation	**No. of Classes: 10**
Topics: Python: Variables and assignments, arrays, control structures, programming styles, plotting in Python, data input/output				
Module 2	Interpolation and Numerical Integration	Assignment	Programming/Simulation	**No. of Classes: 10**
Topics: Interpolation: Lagrange interpolation, Interpolation in 2D, ~~Numerical integration: Newton-Cotes and Gaussian Quadrature~~ Random number generators, Monte Carlo Integration				
Module 3	Differentiation and Fourier Transform	Term Paper	Programming/Simulation	**No. of Classes: 10**
Topics: Concept of differentiation and Fourier Transform using Python programming, ODE solvers, vector and matrix operations. Implementing the methods in programing language, linear algebra				

Targeted Application & Tools that can be used:
Python using Jupyter environment

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course

Assessment Type

- Midterm exam
- Assignment (review of digital/ e-resource from PU link given in references section - mandatory to submit screen shot accessing digital resource.)
- Quiz
- End Term Exam
- Self-Learning

model using Monte- Carlo simulation

Text Book

Landau, Paez, Bordieanu, 'Computational Physics- Problem Solving with Computers', 3rd Ed., Wiley-VCH.

References

1.Jesse M. Kinder and Philip Nelson, 'A Student's Guide to Python for Physical Modeling', Princeton University Press, 2015.
2.University Physics Volumes 1 and 2 (OpenStax, 2016),
https://openstax.org/details/books/university-physics-volume-1
https://openstax.org/details/books/university-physics-volume-2.
3.J.P. Mueller, Beginning Programming with Python for Dummies, Wiley Publications, 2017

E-resources:

https://presiuniv.knimbus.com/user#/searchresult?searchId=computational%20physics&_t=1657687828581

1. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=510994&site=ehost-live

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2. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=566180&site=ehost-live	
Topics relevant to development of "FOUNDATION SKILLS": Python programing, Applying concepts of Physics in computer programs. Topics relevant to " HUMAN VALUES &PROFESSIONAL ETHICS": Team working skills, self-learning	
Catalogue prepared by	Dr. Anindita B Dr. Pradeep Bhaskar Dr. Mohan Kumar Naidu P
Recommended by the Board of Studies on	7th BOS conducted on 25th July, 2022
Date of Approval by the Academic Council	

11. Laser Physics PHY2004

Course Code: PHY 2004	**Course Title:** LASER PHYSICS **Type of Course:** 1] School Core 2] Laboratory integrated	**L-P-C** **2- 0-2**			
Version No.	1.0				
Course Pre-requisites	**NIL**				
Anti-requisites	**NIL**				
Course Description	The course is going to provide a clear and comprehensive introduction to the physical and engineering principles of laser operation and design. Students will understand the basics of laser action to advanced topics in laser physics and engineering.				
Course Out Comes	On successful completion of the course the students shall be able to: CO1: Apply the knowledge of LASER. CO2: Describe the concepts of laser resonators in laser technology. CO3: Apply the knowledge of Gas, Liquid and solid state laser in various applications.				

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Course Objective	The course is designed to improve the learners EMPLOYABILITY SKILLS by using EXPERIENTIAL LEARNING techniques.			
Course Content:	**[1] Theoretical Component:**			
Module 1	**LASER FUNDAMENTALS**	Assignment: Define the interaction of electromagnetic radiation (light) with matter.	Programming/Simulation/Data Collection/any other such associated activity	**No. of Hours: 08**
Introduction to laser. Wave nature of light-The interaction of light with materials. Particle nature of light-Discrete energy levels. Energy levels and Radiative properties of molecules, liquids and solids. Radiation and thermal equilibrium- Absorption and stimulated emission.				
Module 2	**LASER RESONATORS**	Assignment: Explain Fabry-Perot Cavity modes	Programming/Simulation/Data Collection/any other such associated activity	**No. of Hours: 08**
Laser cavity modes-Introduction, Longitudinal laser cavity modes, Transverse laser cavity modes, Properties of laser modes. Stable laser resonators-Stable curved mirror cavities, ~~Properties of real laser beams. Special laser cavities and cavity effects.~~				
Module 3	SPECIFIC LASER SYSTEMS AND APPLICATIONS	Assignment: Describe the laser structure and excitation mechanism for organic dye lasers.	Programming/Simulation/Data Collection/any other such associated activity	No. of Hours: 9
Atomic gas lasers-Helium-Neon Laser, Argon Ion laser, ~~Helium-Cadmium laser~~ Ruby laser, Carbon dioxide laser, X-Ray plasma lasers, Free-electron Lasers, Organic dye lasers, Neodymium YAG and glass lasers, Color center lasers, Semiconductor diode lasers and their applications of different lasers in industries and medical field				
Assignment: Mention the Assignment proposed for this course				
Assessment Type • Midterm exam • Assignment (review of digital/ e-resource from PU link given in references section - mandatory to submit screen shot accessing digital resource.) • Quiz • End Term Exam • Self-Learning				

1. What are the requirements for obtaining population inversions?

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2. A 3 mW laser beam ($\lambda_0 \approx 6328$ Å) is incident on the eye. On the retina, it forms a circular spot of radius of about 20 μm. Calculate approximately the intensity on the retina. 3. Explain the Laser structure and excitation mechanism for color center lasers.
Text Book 1. Thyagarajan, K., and Ghatak, A. (2007), Fiber optic Essentials, John Wiley, NY, 2007 2. Ghatak, A. K. (2009), Optics, McGraw-Hill, New York.
References: 1. Dirac, P. A. M. (1958b), Quantum Theory of Emission and Absorption in Quantum Electrodynamics (J. Schwinger, ed.), Dover Publications, New York. 2. Zernike, F., and Midwinter, J. E. (1973), Applied Nonlinear Optics, Wiley, New York
E-Resources: **https://presiuniv.knimbus.com/user#/searchresult?searchId=laser%20physics&_t=1657688235316**

Catalogue prepared by	Dr. Bharathi D, Dr. Anindita B, Dr. Sivashankara Reddy
Recommended by the Board of Studies on	7th BOS conducted on 25th July, 2022
Date of Approval by the Academic Council	Mention the Academic Council Meeting No. & the date of the meeting:

12. Science and Technology of Energy PHY2005

Course Code:	**Course Title:** **Science and Technology of Energy** **Type of Course:** **Open Elective & Theory only**	**L- P- C**	3	0	3
Version No.	1.0				
Course Pre-requisites	**NIL**				
Anti-requisites	**NIL**				
Course Description	The aim of the course 'Science and Technology of Energy' is to increase knowledge about modern technologies for energy conversion and storage and the scientific principles underlying these technologies. It introduces students to scientific principles of energy conversion and storage and their technological transfer to machines, power plants,				

	batteries and fuel cells. The students also imbibe team working skills while participating in case studies and model making.			
Course Outcomes	On successful completion of this course the students shall be able to: 4) Distinguish between renewable and non-renewable, conventional and non-conventional sources of energy. 5) Explain the advantages and limitations of different sources and forms of energy 6) Recognize the need of conservation of energy sources.			
Course Objective	The course is designed to improve the learners EMPLOYABILITY SKILLS by using EXPERIENTIAL LEARNING techniques.			
Course Content:				
Module 1	NON-RENEWABLE ENERGY SOURCES	Assignment	Report on Advantages and limitations of fossil fuels	**15 Classes**
Topics: Definition of Energy, Importance of Energy in our Life, Various forms of Energy, Different Sources of Energy. Fossil Fuels – Conventional Source of Energy- Coal and Natural Gas, Advantages and Disadvantages of Energy from Fossil Fuels, Energy from the Atom – Nuclear Energy, uses of nuclear energy, Hazards of Nuclear Energy, advantages of using nuclear energy over fossil fuels.				
Module 2	RENEWABLE ENERGY SOURCES	Case Study	Case study on photovoltaic energy production	**15 Classes**
Topics: Sun - The Ultimate Source of Energy, Advantages of Using Solar Energy, Limitations of Using Solar Energy, Wind Energy, Advantages and Limitations, Working of windmill, Hydroelectric Energy, Generation of Hydroelectricity, Advantages of Hydroelectric Power, Limitations in Using Hydroelectric Power, Geothermal Energy, Advantages of Geothermal Energy, Limitations of Using Geothermal Energy, Ocean – A Source of Energy, Using Ocean Wave Power to Generate Energy, ~~Using Tidal Power of Ocean to Generate Energy, Using Ocean Water Temperature Variations to Generate Energy,~~ Advantages and Disadvantages of Using Ocean Energy, Energy from Biomass, Advantages and limitations of Using Biomass as Source of Energy, Energy from bacteria – electricity and microbial solar cells. ~~Hydrogen – A Future Source of Energy.~~				

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Module 3	TRANSFORMATION OF ENERGY	Assignment	Propose alternate sources	15 Classes

Topics:

ENERGY CRISIS AND ITS MITIGATION, Reasons behind Energy Crisis, Methods of Mitigating Energy Crisis, Conservation of Energy, Energy Conversion and Storage System, Basics of Photovoltaic Conversion technology and PV systems~~, Basics of Bioenergy conversion, bio methanation technology, Thermochemical Conversion through Pyrolysis,~~ Basic of Electrochemical energy conversion and storage using Fuel Cells, ~~Basics of Fusion power,~~ Energy Storage Technologies - Mechanical storage, Chemical storage, Electrical storage.

Automotive Energy applications – Hydrogen fuel cells, lithium ion batteries, conventional fossil fuel energy

Targeted Application & Tools that can be used:

1. Physical tools for making working models

Project work/Assignment:

Assessment Type

- Midterm exam
- Assignment (review of digital/ e-resource from PU link given in references section - mandatory to submit screen shot accessing digital resource.)
- Quiz
- End Term Exam
- Self-Learning

Assignment 1: Propose alternate natural and local sources of energy.

Assignment 2: Make a small model of any energy conversion system like windmill, water mill, etc.

Text Book:

1. Boyle, Godfrey –Renewable energy: power for a sustainable future.
2. Kothari D P, Renewable energy sources and emerging technologies

E-Resources:

https://presiuniv.knimbus.com/user#/searchresult?searchId=science%20and%20technology%20of%20energy&_t=1657688527218

1. **https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=207566&site=ehost-live**
2. **https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=433890&site=ehost-live**

References

3. Rachel Gelman, Scott Gossett, Renewable Energy Handbook, 2011. **https://www.nrel.gov/docs/fy13osti/54909.pdf**
4. Herzog, Lipman and Kammen, Renewable Energy Sources, Encyclopedia of Life Support Systems, 2001 EOLSSf.PDF (berkeley.edu)

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5. Sorensen, Bent. Renewable energy : physics, engineering, environmental impacts, economics and planning

Topics relevant to development of "FOUNDATION SKILLS":
Reusing and recycling, renewable and nonrenewable energy sources

Topics relevant to "HUMAN VALUES &PROFESSIONAL ETHICS":
Team work, leadership skills, Concepts of energy conservation and storage

Catalogue prepared by	Dr Deepthi P R Dr Pradeep Bhaskar
Recommended by the Board of Studies on	7th BOS conducted on 25th July, 2022
Date of Approval by the Academic Council	

13. Composite Materials- PHY2007

Course Code:	**Course Title: Composite Materials** **Type of Course: Open Elective & theory only**	**L- P- C**	3	0	3
Version No.	1.0				
Course Pre-requisites	1. Knowledge on Elastic properties of plastic materials 2. Knowledge on MS excel				
Anti-requisites	**NIL**				
Course Description	**The purpose of this course is to enable the students to understand the need of light weight polymer based composite materials (PCM) in various industries. The course improve the abilities on methods of synthesis and characterization of composite materials. The course develops the fair knowledge on ASTM standards and including analytical skills. The course also enhances the programming abilities through assignments.**				

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Course Outcomes	**On successful completion of this course the students shall be able to:** **1) Discuss the different types of polymers and fibers** **2) Apply the synthesis methods and characterization techniques.** **3] Analyze the differences in composite materials.** **4] Recommend the composite material for required application.**			
Course Objective	The course is designed to improve the learners EMPLOYABILITY SKILLS by using EXPERIENTIAL LEARNING techniques.			
Course Content:				
Module 1	**Introduction to Polymer matrix composite**	**Assignment**	**Compare thermoset and thermo plastics**	**No. of classes: 15**
Topics: Definition of composites, Classification of composites; General characteristics of reinforcement- classification, terminology used in fiber science, CMC, MMC and PMC. Polymer matrix composites: Thermoplastic and thermosetting resins; Commonly used matrix reinforcement system; Fibre, Flake and particulate reinforced composites, Reinforcements used in PMC's- glass, carbon, aramids, boron, Roving's, yarns, fabrics, etc.; Thermoset matrices for aerospace components- polyesters, ~~epoxies, phenolics, vinyl esters, cyanate esters, etc.; Thermoplastic matrices for advanced composites- PEEK, polysulfones, polyimides, etc. concept of A stage, B stage and C stage resins~~				
Module 2	**Manufacturing methods and Characterization techniques**	**Case Study**	**Literature survey on manufacturing methods of PMC composites**	**No. of classes: 15**
Topics: ~~Hand and spray lay - up,~~ injection molding, resin injection, filament winding, pultrusion, ~~centrifugal casting and prepregs~~. Fibre/Matrix Interface, mechanical. Measurement of interface strength. Characterization of systems; carbon fibre/epoxy, glass fibre/polyester, etc. X ray techniques- X-ray diffraction, X-ray fluorescence spectrometry; Optical microscopy, Electron microscopy- SEM, TEM; Scanning Probe microscopies- STM and AFM~~; Thermal analysis- TGA, DTA, DSC, DMA, TMA and DMTA; Electrical and magnetic properties- two probe and four probe methods, VSM method; Non-destructive testing.~~				
Module 3	**Composite Analysis and ASTM standards**	**Assignment**	**Data Collection and Analysis**	**No. of classes: 15**
Topics: ~~Geometrical aspects – volume and weight fraction. Unidirectional continuous fibre, discontinuous fibers, Short fiber systems, woven reinforcements –Mechanical Testing~~. Determination of stiffness and strengths of				

unidirectional composites; tension, compression, flexure and shear Thermal analysis: Thermo gravimetric analysis (TGA), Differential thermal analysis (DTA), Differential scanning calorimetry (DSC), Dynamic mechanical analysis (DMA), Thermomechanical analysis (TMA) and Dynamic mechanical thermal analysis (DMTA), Basic theory, Instrumentation and applications, ASTM standards.

Targeted Application & Tools that can be used:

Application area of automotive, aerospace and
Professionally Used Software: Origin software

Topics relevant to development of "FOUNDATION SKILLS": Elastic, thermal and mechanical properties of materials.

Project work/Assignment:

Assessment Type

- Midterm exam
- Assignment (review of digital/ e-resource from PU link given in references section - mandatory to submit screen shot accessing digital resource.)
- Quiz
- End Term Exam
- Self-Learning

Project work: Develop the composite using any polymer and reinforcement fiber
Assignment 1: Study on different methods for synthesis of PMCs
Assignment 2: Literature survey on properties of different PMCs

1. S. Zhang, Lin Li, A. Kumar, Materials Characterisation Techniques, CRC press, 2008.

2. D.A. Skoog, F.J. Holler, S. R. Crouch, Instrumental Analysis, Cengage Learning, 2007.

3. W. W. Wendlandt, Thermal Methods of Analysis, John Wiley, 1974.

4. R.M. Jones, Mechanics of Composites, 2nd ed., Taylor & Francis, 1999.

References

1. B. Raj, T. Jayakumar, M. Thavasimuthu, Practical Non-Destructive Testing, 2nd ed., Narosa Publishing House, 2002.

2. C.R. Brundle, C.A. Evans, S. Wilson, Encyclopedia of Materials Characterisation, Butterworth-Heineman, 1992.

E-Resources:

1.https://presiuniv.knimbus.com/user#/searchresult?searchId=composite%20materials&_t=1657688676858
2. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1800958&site=ehost-live
3. https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1504383&site=ehost-live

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Catalogue prepared by	Dr. T. Ranjeth Kumar Reddy
Recommended by the Board of Studies on	7th BOS conducted on 25th July, 2022
Date of Approval by the Academic Council	

Annexure 3

Proposed list of internal examiners for BOE Panel (Physics Board)

S.No	Emp ID	Name	Designation
1	PUNIV00427	U Mahaboob Pasha	Professor & HOD
2	PUNIV00021	P Mohan Kumar Naidu	Professor
3	PUNIV00023	Deepthi P R	Associate Professor
4	PUNIV00473	Sivasankara Reddy N	Assistant Professor. (SG)
5	PUNIV00873	T Ranjeth Kumar Reddy	Associate Professor
6	PUNIV00921	Naveen Chikkahanumajja Surendranatha	Assistant Professor (SG)
7	PUNIV01030	Anindita Bhattacharya	Associate Professor
8	PUNIV01155	Harish Sharma Akkera	Assistant Professor (SG)
9	PUNIV01281	Pradeep Bhaskar	Assistant Professor(SrG)
10	PUNIV01369	G Srinivas Reddy	Assistant Professor (SG)
11	PUNIV01370	Bharathi D	Assistant Professor(SrG)
12	PUNIV01831	Dr Rajesh Ponraj	Assistant Professor

Proposed list of external examiners for BOS Panel (Physics Board)

Sl. No.	Name of the Faculty and Address	Email ID	Phone No.	Institute Status
01	Dr. Suresh Kumar M. R Associate Professor and HOD	sureshkumarmr.rvitm@rvei.edu.in	9886431547	Autonomous

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	Department of Physics RV Institute of Technology and Management. Kothanur, 8th Phase, JP Nagar, Bengaluru-560076.			
02	Dr Shilpashree S P Assistant Professor Department of Physics Christ University Mysore Road, Kanmanike, Kumbalgodu, Bangalore - 560 060	shilpashreesp@gmail.com	9620958922	Christ University
03	Dr Kiran K S Professor and Head Jain University SOE & T, JGI Global Campus, Jakkasandra Post, Kanakapura Ramnagar, Bangalore-12	kiranxrd@gmail.com	9448419437	Jain University
4	Dr Ramdas Balan, Associate Professor, Department of Physics CMR Institute of Technology Bangalore-37	Email: ramdas.b@cmrit.ac.in	Phone:7760934530	Autonomous
5	Dr Prasanna G D Assistant Professor Department of Physics Davangere University	Email: prasannagd@gmail.com	Phone: 9845238106	Davangere University

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	Davangere-577007			

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