

Bachelor of Science in Physics

B.Sc. - Physics

Programme Project Report & Detailed Syllabus



தமிழ்நாடு திறந்தநிலைப் பல்கலைக்கழகம்

Tamil Nadu Open University

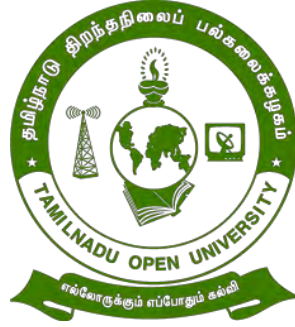
School of Sciences

Department of Physics

Chennai - 15

Programme Project Report (PPR)

Bachelor of Science in Physics



Department of Physics
School of Science

TAMIL NADU OPENUNIVERSITY

577, Anna Salai, Saidapet,

Chennai 60015

TAMIL NADU OPEN UNIVERSITY
Department of Physics
School of Science

Members of Board of Studies

Chairperson

Dr. V. RAMASWAMY,
Professor and Nodal Officer,
Department of Physics,
Annamalai University.
Annamalai Nagar- 608002

Internal Faculty Members

Dr. E. KUMAR
Assistant Professor of Physics
Department of Physics
School of Sciences
Tamil Nadu Open University, Chennai – 15

Dr. P. SHANMUGAVELAN,
Assistant Professor of Chemistry
Department of Chemistry
School of Sciences
Tamil Nadu Open University, Chennai – 15

Member Subject Experts

Dr. G. ANBALAGAN,
Professor,
Department of Nuclear Physics,
University of Madras, Chennai.

Dr. B.M. SORNAMURTHY

Associate Professor,
PG & Research Department of Physics
Presidency College (Autonomous),
Kamaraj Salai, Triplicane, Chennai – 600 005.

Dr.V.ULAGENDRAN

Assistant Professor,
Department of Physics,
Guru Nanak College, Velachery,
Chennai – 600 042.

Industrialist**Mr. CLAUDIOS FERNANDO**

Director, WooryAutomotives India Pvt.Ltd.,
A1B, MMDA Industrial Complex, Maraimalai
Nagar, Kanchipuram Dist.,

Mr. VALANTINE,

Manager,Inkarp Instruments Pvt.Ltd.,
6A, 6B, Thaver Plaza,
1A Nungambakkam High Road,
Chennai - 600 034.

Student on Roll**RAMADEVI R**

Badal flats, No.5, Door No.17.
NSR Road, Nehru Nagar,
Chrompet, Chennai - 600 044.

TAMIL NADU OPEN UNIVERSITY

DEPARTMENT OF PHYSICS

SCHOOL OF SCIENCE

B.Sc., PHYSICS

Programme Project Report (PPR)

Programme's Mission and Objectives: Bachelor of Science in Physics Programme has been designed to provide in basic knowledge in Physics to those students who are not having opportunity to study in regular mode and for drop-out students from rural and urban areas of Tamil Nadu. The main Objective of this Programme is to enable the students to understand the basic knowledge of matter and energy and make them relevant to society.

Relevance of the Programme with HEI's Mission and Goals: The Programme B.Sc., (Physics) is offered to meet current needs of aspiring youths and adult population and also create awareness about the basic scientific aspects to the society. This Programme aims at creating equity in education by providing opportunity to rural people for whom Higher Education is unreachable.

Nature of prospective target group of Learners: Bachelor of Science (Physics) is meant for students who have passed the Higher Secondary Examination with Physics as one of the Subjects or Secondary grade teachers are the target groups are the target groups. It also targets the rural population to reach their dream of obtaining Higher Education for whom the opportunity was denied due to lack of limited number of seats available in the conventional University system.

Appropriateness of Programme to be conducted in ODL mode to acquire specific skills and competence: Bachelor Degree Programme in Physics will meet out the present day needs of academic and Research, Institutions and Industries. As Programme outcome of the students may acquire basic knowledge in Mechanics, Optics, Nuclear, Electronics, Solid State Physics, Nanoscience which will motivate the students to go for higher studies/research in Physics and also acquire skills in the field of application oriented, life oriented, and job oriented electronics. Their

learning needs will be addressed by providing the printed copy of 'Self Learning Materials (SLM)' and Practical classes and Examination are being conducted at LSC's.

Instructional Design:

The Curriculum and the Syllabus for Bachelor of Science in Physics Programme has been designed to provide in basic knowledge in Physics to those students who are not having opportunity to study in regular mode and for drop-out students from rural and urban areas of Tamil Nadu. The main Objective of this Programme is to enable the students to understand the basic knowledge of matter and energy and make them relevant to society. The course for the degree of Bachelor of Science in Physics shall consist of three years (Six Semester) and the medium of instruction is English.

The Bachelor of Science in Physics Programme is offered through the Learner Support Centres established by TNOU in the affiliated Arts and Science College, where the same Programme is offered through Conventional Mode.

The Faculty Members available at Department of Physics, School of Science of Tamil Nadu Open University and the faculties approved as Academic Counselors of TNOU at Learner Support Centres will be used for delivering the Bachelor of Science Degree Programme in Physics.

The credits systems suggested as per UGC-ODL Regulations-2020 have been assigned to The Bachelor of Science in Physics Programme. The total number of credit assigned for the Programme is 134. The Self Learning Materials in the form of print, e-content and audio/video materials wherever required has also been developed for the Programme.

Procedure for admissions, curriculum transaction and evaluation:

Eligibility: Candidates should have passed the Higher Secondary Examination (10+2 pattern) conducted by the Board of Higher Secondary Education, Government of Tamilnadu or any other examination (10+3 pattern) accepted by Syndicate, as

equivalent thereto, with Physics as one of the subjects in the above said patterns.

The Programme Fee is Rs.18000/- for three years, plus Registration and other Charges. The admission are carried out by Tamil Nadu Open University and through its Regional Centres located within the State of Tamil Nadu. The Theory Counselling and the Practical Counselling will be conducted through the Learners Support Centres of Tamil Nadu Open University. The evaluation will be carried by Tamil Nadu Open University consists of Continuous Internal Assessment through Assignment and External Assessment through Term End Examination.

Financial Assistance: SC/ST Scholarship available as per the norms of the State Government of Tamil Nadu. Complete Admission fee waiver for the Physically challenged/ differently abled persons.

Policy of Programme delivery: The Academic Calendar for the Programme will be available for the learners to track down the chronological events/ happenings. The Counselling schedule will be uploaded in the TNOU website and the same will be intimated to the students through SMS.

Evaluation System: Examination to Bachelor's Degree Programme in Physics is designed to maintain quality of standard. Theory will be conducted by the University in the identified Examination Centres. For the Assignments students may be permitted to write with the help of books/materials for each Course, which will be evaluated by the Evaluators appointed by the University.

Continuous Internal Assessment (CIA): Assignment: 1 assignment for 2 credits are to be prepared by the learners. E.g. If a Course is of Credit 6, then 3 number of Assignments are to be written by the learner to complete the continuous assessment of the course. Assignment carries 30 Marks (Average of Total no of Assignment), consists of Long Answer Questions (1000 words) for each Course.

Sec- A	Answer any one of the question not exceeding 1000 words out of three questions.	1 x 30 = 30 Marks
--------	---	-------------------

Theory Examination: Students shall normally be allowed to appear for theory

examination by completing Practical and Assignment. The Term -End Examination shall Carry 70 marks and has PART: A, B and C and will be of duration 3 hours.

Question Pattern for Theory Examinations:

Max. Marks: 70

Time: 3 hours

PART - A ($3 \times 3 = 9$ marks)

Answer any Three questions out of Five questions in 100 words

All questions carry equal marks

1. From Unit - I
2. From Unit - II
3.
From Unit - III
4. From Unit - IV
5. From Unit - V

PART - B ($3 \times 7 = 21$ marks)

Answer any Three questions out of Five questions in 200 words

All questions carry equal marks

6. From Unit - I
7. From Unit - II
8. From Unit - III
9. From Unit - IV
10. From Unit - V

PART - C ($4 \times 10 = 40$ marks)

Answer any Four questions out of Seven questions in 500 words.

All questions carry equal marks.

11. From Unit - I
12. From Unit - II
13. From Unit - III
14. From Unit - IV
15. From Unit - V
16. From any unit
17. From any unit

Pattern of Question Paper for Practical Examinations;

Each set of question paper should contain SEVEN questions and the candidate has to choose one by lot.

Awarding of marks for Practical examinations.

Total Marks: 100 (External Practical 70 Marks +Internal (Record 20 Marks + Practical Counselling Class Attendance 10 Marks)

Distribution for 70 Marks:

Formula, circuit diagram and tabular column: 20 Marks

Observation: 35 Marks

Result: 5 Marks

Presentation: 10 Marks

Total: 70 Marks

Passing Minimum:

For Theory Examination:The candidate shall be declared to have passed the examination if the candidate secures not less than 25 marks in the University examination in each theory paper and overall 40 percent in both Term End Examination and Continuous Internal Assment (Assignment) taken together.

Continuous Internal Assessment (CIA)		Term End Examination (TEE)		Overall Aggregated Marks	Maximum Marks
Minimum Pass Mark	Maximum Mark	Minimum Pass Mark	Maximum Mark	CIA + TEE	
13	30	25	70	40	100

For Practical Examination: The candidate shall be declared to have passed the examination if the candidate secures not less than 30 marks in the External Practical Examinations and secures not less than 10 marks in the Continuous Internal Assessment (CIA) (Record Marks + Practical Counselling Class Attendance) and

overall aggregated marks is 40 marks in both external and internal taken together. However submission of record notebook is a must.

Classification of Successful Candidate: Candidates who pass all the Courses and who secure 60 per cent and above in the aggregate of marks will be placed in the First Class. Those securing 50 per cent and above but below 60 per cent in the aggregate will be placed in the Second Class.

Requirement of laboratory and Library Resources:

The Programme will be offered through the Learner Support Centre (LSC) maintained by Tamil Nadu Open University. The LSC's have the required infrastructural facilities to conduct the Counselling for the students who wish clear their doubts and also they are having well equipped laboratory facilities relevant to the Bachelor Degree Programme in Physics.

A well-equipped Library is available in the University Headquarters with about 24,000 books and lot of research journals. The Learners Support Centre through which the Degree Programme is to be offered is also equipped with a full-fledged library having books and journals related to Physics.

Quality Assurance Mechanism & Programme Outcomes: The Quality of the Bachelor's degree Programme in Physics is maintained by adopting the curriculum suggested by the UGC. As per UGC guidelines the core courses, four elective courses, two subject specific elective courses, four practical courses are included in the Programme. The Curriculum of Bachelor's Degree Programme in Physics was approved by the Board of Studies on 19.06.2020. It will be placed for approval forthcoming Academic Council and Syndicate of our University subsequently. As a part of Quality assurance, the curriculum for the Programme will be updated once in three years. Necessary steps will be taken to obtain feedback from the students and the Academic Counsellors who are part of the Programme for effective delivery of the Programme.

Programme's Objectives

Bachelor of Science in Physics Programme has been designed to provide in basic knowledge in Physics to those students who are not having opportunity to study in regular mode and for drop-out students from rural and urban areas of Tamil Nadu. The main Objective of this Programme is to enable the students to understand the basic knowledge of matter and energy and make them relevant to society. While studying this programme, the learner will be

PO 1: Utilizing the physics concepts in the day-to-day life for better living. Applying the physics theories in the workplaces and homes to make better decision and choice.

PO 2: Succeed in obtaining employment appropriate to their interests, education and will become a valuable physicist

PO 3: Technical Proficiency- Succeed in obtaining employment appropriate to their interests, education and will become valuable physicist.

PO 4" Professional Growth-Continue to develop professionally through life-long learning, higher education, research and other creative pursuits in their areas of specialization.

PO 5: Management Skills-Improve leadership qualities in a technical and social Response through innovative manner.

Programme Specific Outcomes – B.Sc., Physics

While after completing this Programme the learner, shall be able to

PSO 1: Interpret the knowledge of the consequences of physics to manage projects in multidisciplinary environment.

PSO 2: Apply the principles of physics to solve problems in interdisciplinary fields of science.

PSO 3: Classify various opportunities associated with applications of Laws of Physics.

PSO 4: Develop the awareness to be professionally and ethically responsible in the

scientific domain.

PSO 5: Acquiring a rigorous knowledge in fundamental areas of Physics.

PSO 6: Application of knowledge to real-life problems.

Programme Learning Outcomes

PLO 1: **Science Knowledge:** Apply pure and interdisciplinary science knowledge for the solution of various scientific and engineering problems.

PLO 2: **Problem analysis:** Identify, formulate, review research literature, and analyze scientific problems reaching validated conclusions using basic principles of sciences.

PLO 3: **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis, and interpretation of data, and synthesis of the information to provide valid conclusions.

PLO 4: **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern IT tools including prediction and modeling to complex scientific activities with an understanding of the limitations.

PLO 5: **The science and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional practice.

PLO 6: **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the scientific practice.

PLO 7: **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PLO 8: **Communication:** Communicate effectively on various activities with the Science community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.

PLO 8: Science projects and funding: Demonstrate knowledge for writing and managing scientific projects in various disciplines and apply these to its own work, as a member and leader in a team, manage funds for scientific projects from various funding agencies and NGOs.

PLO 9: Lifelong learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Mapping the Curriculum

Mapping of curriculum for B.Sc., Physics Core Course

	BPHYS-11	BPHYS-21	BPHYS-31	BPHYS-32	BPHYS-41	BPHYS-42	BPHYS-51	BPHYS-52	BPHYS-51	BPHYS-53	BPHYS-54	BPHYS-61	BPHYS-62
Fundamental understanding of the field	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Application of basic Physics concepts	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Linkages with related disciplines	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Procedural knowledge for professional subjects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Skills in related field of specialization	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ability to use in Physics problem	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Skills in Mathematical modeling	✓	✓	✓	-	✓	✓	✓	✓	✓		✓	-	✓
Skills in performing analysis and interpretation of data	✓	✓	✓	-	-	✓	✓	✓	✓	✓	✓	✓	✓
Develop investigative Skills	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Skills in problem	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

solving in Physics and related Discipline													
Develop Technical Communication skills	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Developing Analytical skills and popular communication	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	-	✓
Developing ICT skills	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Demonstrate Professional behaviour with respect to attribute like objectivity, ethical values, self reading, etc	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓

Mapping of curriculum for B.Sc., Physics
GE- Generic Electives /DSE- Discipline Specific Electives /SEC- Skill Enhanced Courses

	BMSSA-11	BMSSA-22	BCHESA-41	BCHESA-42	BPHYSE-51A	BPHYSE-51B	BPHYSE-62A	BPHYSE-62B	BPHYS-P1	BPHYS-P2	BPHYS-P3	BPHYS-P4
Fundamental understanding of the field	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Application of basic Physics concepts	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Linkages with related disciplines	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Procedural knowledge for professional subjects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Skills in related field of specialization	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ability to use in	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	✓

Physics problem												
Skills in Mathematical modeling	✓	✓	✓	✓	-	✓-	✓	✓	-	-	-	-
Skills in performing analysis and interpretation of data	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Develop investigative Skills	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Skills in problem solving in Physics and related Discipline	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	✓	✓
Develop Technical Communication skills	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Developing Analytical skills and popular communication	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Developing ICT skills	✓	✓	-	-	-	✓	✓	✓	✓	✓	✓	✓
Demonstrate Professional behaviour with respect to attribute like objectivity, ethical values, self reading, etc	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Structure of B.ScPhysics programme:

S. No	Course Code	Course Title	Category	Credits	Marks Distribution		
					CIA*	TEE**	Total
I Year- Semester - I							
1	BFTMS-11	Tamil	Language	4	30	70	100
2	BFEGS-11	Foundation in English	Language	4	30	70	100
3	BPHYS-11	Properties of Matter and Sound	CC	5	30	70	100
4	BMSSA-11	Allied Mathematics - 1	GE	4	30	70	100
I Year- Semester -II							
5	BFTMS-21	Tamil	Language	4	30	70	100
6	BFEGS-21	Foundation in English	Language	4	30	70	100
7	BPHYS-21	Mechanics	CC	5	30	70	100
8	BMSSA-22	Allied Mathematics - 2	GE	4	30	70	100
9	BPHYS-P1	Practical - I	SEC	4	30	70	100
II Year-Semester - III							
10	BFTMS-31	Tamil	Language	4	30	70	100
11	BFEGS-31	Foundation in English	Language	4	30	70	100
12	BPHYS-31	Optics and Spectroscopy	CC	5	30	70	100
13	BPHYS-32	Heat and Thermodynamics	CC	5	30	70	100
14	BCHESEA-31	Allied chemistry-1	GE	4	30	70	100
II Year- Semester - IV							
15	BFTMS-41	Tamil	Language	4	30	70	100
16	BFEGS-41	Foundation in English	AECC	4	30	70	100
17	BPHYS-41	Electricity and Magnetism	CC	5	30	70	100
18	BPHYS-42	Basic Electronics	CC	5	30	70	100
19	BCHESEA-42	Allied Chemistry-1	GE	4	30	70	100
20	CCES	Environmental Studies	AECC	2	30	70	100
21	BPHYS-P2	Practical- II	SEC	4	30	70	100
III Year-Semester - V							
22	BPHYS-51	Atomic Physics	CC	5	30	70	100
23	BPHYS-52	Relativity and Quantum Mechanics	CC	5	30	70	100
24	BPHYS-53	Digital electronics	CC	5	30	70	100
25	BPHYS-54	Mathematical Methods	CC	5	30	70	100
26	BPHYSE-51A / BPHYSE-51B	Energy Physics / Problems solving skills in Physics	DSE	4	30	70	100
III Year- Semester -VI							
27	BPHYS-61	Solid state Physics	CC	5	30	70	100
28	BPHYS-62	Nuclear Physics	CC	5	30	70	100
29	BPHYSE-62A / /	Nano Physics / /	DSE	4	30	70	100

	BPHYSE-62B	LASER Physics					
30	BPHYS-P3	Practical - III	SEC	4	30	70	100
31	BPHYS-P4	Practical -IV	SEC	4	30	70	100
Total- [(I+II+III) Year]				134	930	217	3100
Courses for Other Departments							
1	BPHYSA 11	Allied Physics - I	GE	4	30	70	100
2	BPHYSA 22	Allied Physics - II	GE	4	30	70	100
3	BPHYS-NE1	Basic Principle of Physics	GE	4	30	70	100
4	BPHYS-NE2	Energy Physics	GE	4	30	70	100

* Continuous Internal Assessment (CIA)

Term End Examination (TEE)

CC- Core Courses

GE- Generic Electives

DSE- Discipline Specific Electives

SEC- Skill Enhanced Courses

AECC- Ability Enhancement Compulsory Courses

Detailed Syllabus



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus - I year - I Semester (Distance Mode)

பாடப்பெயர் (Course Title)	:	தமிழ் - I (Tamil - 1)
பாடக் குறியீடு (Course Code)	:	BFTMS-11
பாட கற்றல் அளவெண் (Course Credits)	:	4

பாட நோக்கங்கள்

1. தமிழ் இலக்கியங்களை அறிமுக நோக்கில் எடுத்துரைத்தல்
 2. மொழித்திறன், மொழியறிவு, இலக்கியப்பொது அறிவுபெறும்வகையில் விவரித்தல்
-

பாடத்திணைப் படிப்பதால் விளையும் பயன்கள்

1. தமிழிலுள்ள சமய இலக்கியங்கள், சிற்றிலக்கியங்கள், மரபுக் கவிதை, புதுக் கவிதை, உரைநடை இலக்கியங்கள், மு.வ.வின் உரைநடைச் சிறப்புகள், பாரதிதாசனின் அமைதி நாடகச் சிறப்புகள் பற்றி மாணவர்கள் விரிவாக எடுத்துரைப்பார்கள்.
-

பிரிவு - 1 பன்னிரு திருமுறைகள்

தமிழில் சமய இலக்கியங்கள் - சமய இலக்கியத் தோற்றம், சமணமும் பௌத்தமும், சைவ சமய வளர்ச்சி, பன்னிரு திருமுறை பட்டியல் - திருஞானசம்பந்தர் தேவாரம் பாடல் சிறப்புகள். - (திருநாவுக்கரசரின் மாசில் வீணையும், நம்கடம்பனைப் பெற்றவள், சுந்தரர் - பித்தா பிறைசூடி, பொன்னார் மேனியனே, மாணிக்கவாசகர் - வானாகி மண்ணாகி, பால்நினைந்து ஊட்டும், திருமூலரின் ஒன்றே குலமும் ஒருவனே தேவனும், அன்பும் சிவமும் இரண்டென்பர், காரைக்காலம்மையார் - இன்று நமக்கெளிதே மாலுக்கும், அறிவானும் தானே அறிவிப்பான் .

பிரிவு - 2 நாலாயிரத் திவ்யப் பிரபந்தம்

முதல் மூன்று ஆழ்வார்கள் - பொய்கையாழ்வார் பாடல் - வையம் தகளியா வார்கடலே, பூத்ததாழ்வார் பாடல் - அன்பே தகளியா ஆர்வமே - பேயாழ்வார் - திருக்கண்டேன் பொன்மேனி கெண்டேன், திருமழிசை ஆழ்வார் பாடல் 17

அன்பாய் ஆரமுதம் ஆவாய், நம்மாழ்வார் - இவையும் அவையும் உவையும், மதுரகவியாழ்வார் - நன்மையால் மிக்க நான்மறை, குலசேகராழ்வார் - செல்வத்து அரம்பையர்கள், பெரியாழ்வார் - மாணிக்கம் கட்டி வயிரம் இடைகட்டி - ஆண்டாள் - மத்தளம் கொட்ட வரிசங்கம், தொண்டரடிப் பொடியாழ்வார் - பச்சைமா மலைபோல் மேனி, திருப்பாணாழ்வார் - கொண்டல் வண்ணனைக் கோவலனாய், திருமங்கையாழ்வார் - குலம்தரும், செல்வம் தந்திடும், அடியார்.

பிரிவு - 3

சீறாப்புராணம் (கதீசா கனவு கண்ட படலம்)

சீறாப்புராணம் - காப்பிய அமைப்பு, கதீசா கனவு கண்ட படலம், காப்பிய முன்கதைச் சுருக்கம், படலக் கதைச் சுருக்கம் - கதீசா கனவு கண்டு எழுதல் - கதீசாகண்டகனவு, கதீசாவின் ஏமாற்றம் - கதீசாவின் இயல்புநிலையில் மாற்றம் - ஒப்பனை துறந்தவிரக்தி, பஞ்சணை பொருந்தாநிலை - கதீசாவின் புலம்பல் - விதவசம்பொருந்துமோ எனல், மாதுலன்வசனம் சிதையுமோ எனல், கதீசாதேம்புதல். - மெசறாவின் மடல்வருதல் - மெசறா எழுதியபத்திரம், சித்திரவரிதொறும் முத்தமிடுதல், கடலில்தவிப்பார்க்குக்கிடைத்த மரக்கலம்.

பிரிவு - 4

தேம்பாவணி (காட்சிப்படலம்)

தேம்பாவணி - காப்பிய அமைப்பு, காட்சிப்படலம், காப்பிய முன்கதைச் சுருக்கம், படலக்கதைச் சுருக்கம், - கோவர்கூட்டம்வந்துகாணுதல் - குழந்தைஇயேசுவைத்தொழுதல், முல்லையார்தந்த முல்லைமாலை, பேரின்பத்தால் உயிர் ஊஞ்சலாடல் - கோவலர்போற்றி வாழ்த்துதல் - நீவிப்போன ஆட்டைமீட்கவோ உதித்தனை எனல், பிணிக் குலத்தக்கது உதித்தபெற்றிபோற்றல், அன்னையையும் ஆண்டவரையும் வாழ்த்துதல் - கோவலர் செலுத்திய காணிக்கை - இடைச்சியர் மாலைசாத்தல், இடையர்தந்தபால்காணிக்கை, குழந்தைஇயேசுவின் அருள்நோக்கு - ஓகனோடு ஓங்குதாயும் வாழ்த்தினாள் - அன்பால் பீறிட்ட ஆனந்தக்கண்ணீர்மழை, வேந்தரை நீக்கி ஆயரைத்தெரிந்ததென்னல்.

பிரிவு - 5

முத்தொள்ளாயிரம் (யானைமறம் - மருப்புண்சியாக, கொடிமதில்பாய்ந்துஇற்ற, அயிற்கதவம்பாய்ந்துழக்கி, கைக்கிளைப்பாடல்கள் - உழுத உழுத்தஞ்சேய், நாண் ஒருபால்வாங்கநலன் ஒருபால், ஆய்மணிப்பைம்பூண் எனத்தொடங்கும் பாடல்கள்)

நந்திக்கலம்பகம் (ஊசல், மறம் உறுப்பில் அமைந்த பாடல்கள்) தமிழில் சிற்றிலக்கியங்கள் - சிற்றிலக்கியத்தோற்றம், சிற்றிலக்கியவகைகள், கலம்பகம், பிள்ளைத்தமிழ் - முத்தொள்ளாயிரம் - நூல்பெயர் விளக்கம், அமைப்பு, யானைமறம் விளக்கம், கைக்கிளை விளக்கம், - முத்தொள்ளாயிரம் 18

யானைமறம்பாடல்கள் - பாண்டியன்யானைமறம் - ஒருபாடல், சோழன்யானைமறம் - ஒருபாடல், சேரன்யானைமறம் - ஒருபாடல் - முத்தொள்ளாயிரம் - கைக்கிளைப்பாடல்கள் - பாண்டியன்கைக்கிளை - ஒருபாடல், சோழன்கைக்கிளைஒருபாடல், சேரன்கைக்கிளைஒருபாடல், - நந்திக்கலம்பகம் - ஊசல், மறம் - கலம்பகஊறுப்புகள் 18 விளக்கம், ஊசல்உறுப்பில்அமைந்தபாடல், மறம்உறுப்பில்அமைந்தபாடல் - நந்திக்கலம்பகம், தலைவன்தலைவிகூற்று - தலைவன்கூற்றுப்பாடல், தலைவிகூற்றுப்பாடல்.

பிரிவு - 6 மீனாட்சியம்மைபிள்ளைத்தமிழ் (அம்புலிபருவம்)

பிள்ளைத்தமிழ்விளக்கம் - பிள்ளைத்தமிழ்பின்பத்துப்பருவங்கள், பிள்ளைத்தமிழ்க்குஅம்புலி - விளக்கம், - சாமம்என்னும்வழிமுறை - சாமம்விளக்கம், சாமம்வழிமுறைப்பாடல் - தானம்என்னும்வழிமுறை - தானம்விளக்கம், தானம்வழிமுறைப்பாடல் - பேதம்என்னும்வழிமுறை - பேதம்விளக்கம், பேதம்வழிமுறைப்பாடல் - தண்டம்என்னும்வழிமுறை - தண்டம்விளக்கம், தண்டம்வழிமுறைப்பாடல்.

பிரிவு - 7 இக்கால மரபுக்கவிதைகளும் பாட்டு இலக்கியமும்

மரபுக் கவிதைகளும் பாட்டு இலக்கியமும் - மரபுக் கவிதைகள் விளக்கம், பாட்டுக்கள் - வள்ளலார், பாரதியார், பாரதிதாசன் - வள்ளலார் இராமலிங்க அடிகள் பாடல் - ஒருமையுடன் நினது திருமலரடி... - பாரதியார் - யாமறிந்த மொழிகளிலே - பாரதிதாசன் - காலைஇளம் பரிதியிலே... நாமக்கல் கவிஞர், கவிமணி - நாமக்கல் கவிஞர் இராமலிங்கம்பிள்ளை பாடல் - தமிழினென்று சொல்லடா... - கவிமணி தேசிகவிநாயகம் பிள்ளை - புலர்ந்து விடியும் பொழுதினிலே...சுரதா, முடியரசன் - சுரதா - சுவரின்மேல் ஒட்டிக் கொண்டிருக்கும் - முடியரசன் - சாதியைத்தான் முன்வைத்துச் சான்றுகின்றார்.

கண்ணதாசன் - கேள்வி பிறந்தது அன்று, மருதகாசி - சமரசம் உலாவும் இடமே, பட்டுக்கோட்டையார் - சின்னப்பயலே சின்னப்பயலே...

பிரிவு - 8 புதுக் கவிதைகளும் ஐக்கூக் கவிதைகளும்

புதுக்கவிதைகளும் ஐக்கூக் கவிதைகளும் - புதுக் கவிதைகள் விளக்கம், - நா. காமராசன் - பாற்கடல் அமுதத்தை..., அப்துல் ரகுமான்- நாற்காலியாய் இருந்தவன் ..., மீரா - மூட்டை மூட்டையாய்..., சிற்பி - அகன்ற உலகு நான்..., இன்குலாப் - பதவியூர் போகும்..., மு. மேத்தா - என்னுடைய சம்பளநாளில்..., அபி - பகல்வெளியில் எங்கோ..., ஈரோடு தமிழன்பன் - நீலச் சேற்றில்..., சேசாலம் - மண்ணின் வெடிப்பை..., வைரமுத்து - அவிழ்ந்த கூந்தலை அள்ளிமுடிக்க..., ஐக்கூக் கவிதைகள் - அப்துல் ரகுமான் - இரவெல்லாம் ..., அமுதபாரதி - எரியும் பிணங்கள், மித்ரா - பசித்த குழந்தைகள், அறிவுமதி19

மரம் வெட்டிய..., கழனியூரன் – அன்புடைமை...

பிரிவு – 9

மு. வரதராசனாரின் "தமிழுக்கு முதல் இடம்"

தமிழில் உரைநடை வளர்ச்சி – உரைநடையின் தோற்றம், தமிழில் கட்டுரைகள், தமிழில் மணிப்பிரவாள நடை, தமிழில் தனித்தமிழ்நடை, – மு. வரதராசனார் உரைநடை,- மொழிப்பற்று நூல் அறிமுகம், தமிழுக்கு முதல் இடம் – கட்டுரை உட்பொருள் – தமிழுக்கு முதல் இடம் – தமிழ்நாட்டுக் கோயில்களில் வடமொழி, தமிழ் இசை கருநாடக இசையாக மாறிப்போனது, தமிழ் இசைக்கு முதல் இடம், ஆட்சித் துறையில் தமிழுக்கு முதல் இடம், ஆட்சிமொழி எவ்வழி பிறகுறைகள் அவ்வழி, இதழியல் துறையில் தமிழுக்கு முதல் இடம், ஆங்கிலப் பத்திரிகைகளும் அமாவாசைச் சாமியார்களும்.

பிரிவு – 10

பாரதிதாசனின் "அமைதி" நாடகம்

தமிழில் உரைநடை நாடக வளர்ச்சி, – தமிழில் நாடகங்களின் தோற்றம், 20 ஆம் நூற்றாண்டில் தமிழ் நாடகங்களின் நிலை, முத்தமிழில் நாடகத்தமிழ் விளக்கம், மௌன மொழி உலகப் பொதுமொழி. – பாரதிதாசன் என்னும் நாடக ஆசிரியர் – புரட்சிக்கவிஞரின் நாடகப் புரட்சி, பிரெஞ்சு நாடகத் தாக்கம், அமைதியின் சிறப்பு – அமைதி நாடகக் கதைச் சுருக்கம் – அமைதி – களம் ஒன்று, களம் – இரண்டு , களம் மூன்று, களம் நான்கு, களம் ஐந்து, களம் ஆறு, களம் ஏழு, அமைதி நாடகத் திறனாய்வு.

பார்வை நூல்கள்:

1. மு. வரதராசன், தமிழ் இலக்கிய வரலாறு, சாகித்ய அக்காதெமி, புதுடெல்லி.
2. மது. ச. விமலானந்தன், தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை.
3. தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை.



B.Sc., Physics - Syllabus - I year - I Semester (Distance Mode)

COURSE TITLE : Foundation in English-I (Literature and Grammar)

COURSE CODE : BFEGS- 11

COURSE CREDIT : 4

COURSE OBJECTIVES

- To make the learners aware of the history of England
 - To cultivate the creativity among the learners
 - To improve the reading skills of the learners
 - To enhance the vocabulary of the learners
 - To make the learners read and write in English
-

Block-1 Brief History of England

Tudor England- Stuart England -Restoration England -Revolutions -Eighteenth Century-19th Century Education- 20th Century

Block 2 Literary Texts

R.K. Narayan- *An Astrologer's Day* and Sarojini Naidu - *Bangle Sellers*

Block-3 Reading Comprehension

Definition of Comprehension- Types of Comprehension- Reading Materials- Vocabulary- Critical Reading- Effective Reading- Exercises

Block -4 Functional Grammars and Vocabulary

Parts of Speech- Tenses-Articles -Prepositions and Linkers -Punctuation-Common Mistakes -Polite Expression-Affixes

Block-5 Language Skills

Reading Skills: SQ3R Technique -Writing Skills -Dictionary Use

References:

1. Narayan R.K. *Short Story Collections*.
2. Sarojini Naidu. *Bangle Sellers*
3. Sinha C.A. *Reading Comprehension*. Prabhat Prakashan.

4. Xavier A.G. *An Introduction to the Social History of England*. Viswanathan S. Printers, Chennai. 2009.

Web Resources:

1. <https://www.digimat.in/nptel/courses/video/109106124/L01.html>
2. <https://www.digimat.in/nptel/courses/video/109106138/L46.html>
3. <https://www.coursera.org/lecture/multimodal-literacies/9-2-learning-to-read-reading-for-meaning-HdG3O>
4. <https://nptel.ac.in/courses/109/107/109107172/>

COURSE OUTCOMES

On successful completion of the Course, the learners will be able to:

- describe the history of England
- critically analyse the literary texts
- use the words correctly
- write in flawless English



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus – I year – I Semester (Distance Mode)

COURSE TITLE : PROPERTIES OF MATTER AND SOUND

COURSE CODE : BPHYS- 11

COURSE CREDIT : 5

COURSE OBJECTIVES

While studying the **PROPERTIES OF MATTER AND SOUND**, the Learner shall be able to:

CO 1: Explain the elastic properties of materials and their use in various fields and its application in manufacturing technology.

CO 2: Evaluate the basic properties of liquids like surface tension and viscosity.

CO 3: Describe harmonic motion and its characteristics.

CO 4: Establish the mathematical formulation of SHM and Discuss the basic characteristics of sound and its application in various fields.

CO 5: Describe the production of Ultrasonics and its application in various fields.

COURSE SYLLABUS

BLOCK - I: Elasticity

Elasticity -- Hooke's law - Elastic moduli - Poisson's ratio- Beams - bending of beams - Expression for bending moment - Cantilever- Theory of uniform and non - uniform bending - Determination of young's modulus -Koenig's method - Torsion of a body - Expression for couple per BLOCKtwist - Work done in twisting a wire - Torsional oscillations of a body - Rigidity modulus by dynamic torsion method (Torsional pendulum) and static torsion method.

BLOCK II: Surface Tension

Surface tension - definition - Molecular forces - Explanation of surface tension on

kinetic theory- Surface energy – work done in increasing the area of a surface – Excess pressure inside a curved liquid surface – Excess pressure inside a spherical and cylindrical drops- Determination of Surface Tension- bubbles-drop weight method- - angle of contact- Quincke's method - Application of Surface Tension- variation of surface tension with temperature-experimental determination-Jaeger's method.

BLOCK III: Viscosity

Viscosity – Co efficient of viscosity – Streamlined and turbulent motion – critical velocity –

Capillarity- Rate of flow of liquid in a capillary tube – Poiseuille's formula- Determination of Viscosity- viscosity of highly viscous liquid-terminal velocity-stoke's method-Ostwald Viscometer-Viscosity of gas-Mayer's formula-Rankine 's method

BLOCK IV: Sound

Simple Harmonic Motion –Composition of two S.H.M in a straight line-at right angles-Lissajous's figures-Types of Vibration-Free, Damped, Forced vibrations – Resonance -Fourier theorem-application-Laws of transverse vibration of strings – Sonometer-Determination of AC frequency using sonometer – Determination of frequency using Melde's apparatus-Decibels – Intensity levels – decibel-noise pollution.

BLOCK V: Ultrasonics and Acoustics

Ultrasonics –Production – Piezoelectric crystal method – Magnetostriction method- Properties and Applications of Ultrasonics-Acoustics of building – Reverberation- Sabine's Reverberation formula (No derivation) – Factors affecting acoustics of building- Sound distribution in an auditorium- Requisites for good acoustics.

Book for Study:

1. Elements of properties of matter – D.S. Mathur – S. Chand & Co., 2004.

2. Properties of matter – R. Murugesan – S. Chand & Co., 2004.
3. Properties of matter – Brijlal and Subramanian S. Chand & Co., 2006.
4. Textbook of Sound, D.R.Khanna and R.S. Bedi, Atmaram and sons, 1969.
5. A Text Book of Sound, N.Subrahmanyam and BrijLal, Vikas Publishing House - Second revised edition,1995.

Books for reference:

1. Fundamentals of General Properties of Matter by H.R.Gulati, S. Chand & Co., NewDelhi (1982).
2. Fundamental of Physics, D. Hallidary , Resnick and J Walker, 6th Edition, Wiley, New York 2001.

Web Resources

1. <https://www.generationgenius.com/properties-of-matter-for-kids/>
2. <https://Physics.info/elasticity/>
3. <https://www.nasa.gov/specials/X59/science-of-sound.html>
4. [NPTEL :: Physics - NOC:Waves and Oscillations](#)

COURSE LEARNIN OUTCOMES

After completion of the **PROPERTIES OF MATTER AND SOUND**, the Learner will be able to:

CLO 1: Distinguish and interpret the elastic nature of the materials

CLO 2: Describe the real-life experiences of Surface tension and variation of surface

tension with temperature

CLO 3: Identify the most and least viscous fluids and Capillarity of liquids.

CLO 4: Analyze types of vibration and noise pollution

CLO 5: Distinguish the methods of producing ultrasonic waves and Design and operate acoustic systems



COURSE TITLE : **ALLIED MATEMATICS - 1**
COURSE CODE : **BMSSA 11**
COURSE CREDIT : **4**

COURSE OBJECTIVES

While studying the **ALLIED MATEMATICS - 1**, the Learner shall be able to:

- CO 1: Acquire knowledge of solving problem in Matrices.
 - CO 2: Learn about the differentiation and able to find n th derivative of a certain given function.
 - CO 3: Represent the partial differential equation by eliminating arbitrary constants and arbitrary functions.
 - CO 4: Understand and find Fourier series of a given periodic trigonometric functions.
 - CO 5: To introduce the concept of Operational Research.
-

COURSE SYLLABUS

BLOCK- I: Properties of Matrices

- 1.1 Eigenvalues and Eigenvectors
- 1.2 Cayley Hamilton Theorem
- 1.3 Similar Matrices
- 1.4 Diagonalization of Matrices possessing Distinct Eigenvalues
- 1.5 Eigenvalues for symmetric matrices

BLOCK -II: Differential Calculus

- 2.1 Higher Derivatives - n^{th} derivative - Standard Results
- 2.2 Trigonometric Transformations
- 2.3 Formation of Equations Involving Derivatives
- 2.4 Leibnitz's formula for n^{th} derivative - Problems involving Leibnitz's formula
- 2.5 Methods of Integration of functions of the Following Types:

$$\frac{1}{(x+p)\sqrt{ax^2+bx+c}} : \sqrt{(x-a)(b-x)} ; \frac{1}{\sqrt{(x-a)(b-x)}} ; \sqrt{\frac{(x-a)}{(b-x)}}$$

BLOCK-III: Differential Equations

3.1 Partial Differential Equation

Formation of Equations by Elimination of Constants and an Arbitrary Function

Definition of General, Particular, Complete and Singular Integral

Solutions of First Order Equations in their Standard Forms

Lagrange's Method of Solving of Linear Equations $Pp \square Qq \square R$

BLOCK-IV: Fourier Series

Definition of Fourier Series

Finding Fourier Coefficients for a given Periodic Function with Period $2 \square$

Odd and Even Functions

Half - Range Series

Development in sine and cosine series

BLOCK-V: Linear Programming Problem

Formulation of LPP

Graphical Method

Simplex Method

BOOKS FOR STUDY

1. Narayanan, S., Hanumantha Rao and T.K. Manicavachagam Pillai, *Ancillary Mathematics – Volume - I*. Madras.: Viswanathan, S, 2012.

Chapter 3: Sections 3.4, 3.5

Chapter 6: Sections 6.1

2 Narayanan S., R. Hanumantha Rao, T.K. Manicavachgam Pillay, and P. Kandaswamy.

3 *Ancillary Mathematics – Volume – II*. Madras.: Viswanathan, S, 1995 Reprint 2011.

Chapter 1 : Sections 8 (cases 5-9)

Chapter 2 : Sections 1 - 5

Chapter 6 : Sections 1-3, 5, 6.

4. Kalavathy S, *Operations Research*, Vikas Publishing House, Noida, Fourth Edition

2013

Chapter 2 : Sections 2.1, 2.2

Chapter 3 : Sections 3.1 – 3.3

Chapter 4 : Sections 4.1, 4.2

BOOKS FOR REFERENCE

1. Joseph, Edwards, *An Elementary Treatise on the Differential Calculus*, London: Macmillan, 1948.
2. Manicavachagam Pillai T.K., Natarajan T. and Ganapathy K. S, *Algebra Volume I*. Madras.: Viswanathan, S., 2006.
3. Manicavachagam Pillai T.K., Natarajan T. and Ganapathy K. S, *Algebra Volume II*. Madras.: Viswanathan, S., 2004.
4. Singaravelu A., *Allied Mathematics*, Chennai: Meenakshi, 2010
5. Sundaresan V., K.S. Ganapathy Subramanian, K. Ganesan. *Resource Management Techniques*, 4th ed. Arapakkam: A.R. Publications, 2007.

Web Resource:

<https://www.youtube.com/watch?v=61fj80rmULA>
<https://www.youtube.com/watch?v=AsW8W7YZILs>
<https://www.youtube.com/watch?v=EJG6gBeVdfw>
https://www.youtube.com/watch?v=mv8AWRs_Fww
<https://www.youtube.com/watch?v=AS7THLj-OhI>
https://www.youtube.com/watch?v=LT_10p_eu88
<https://www.youtube.com/watch?v=d6ama9rgFTY>
<https://www.youtube.com/watch?v=wmCIrpLBFds>
<https://www.youtube.com/watch?v=1BjOvv6G3dA>
<https://www.youtube.com/watch?v=TS9V9OfBggI>
<https://www.youtube.com/watch?v=zaPGRX3s9fk>
<https://www.youtube.com/watch?v=8IRrgDoV8Eo>
<https://www.youtube.com/watch?v=ku1KSgBfzs4>
<https://www.youtube.com/watch?v=qQFAvPF2OSI>

COURSE LEARNING OUTCOMES

After completion of the **ALLIED MATHEMATICS - 1**, the Learner will be able to:

CLO 1: Familiarized about Eigen values and Eigen vectors and able to diagonalize the matrix for distinct Eigen values.

CLO2: Recall the concept of differentiation and nth derivatives; and solve the simple related problems.

CLO 3: Classify the different forms of first order partial differential equation and able to solve the problems of Physics.

CLO 4: Represent the given function in terms of sine and cosine terms in Fourier series.

CLO 5: Familiarize with the basics of Linear Programming Problem.



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus - I year - II Semester (Distance Mode)

பாடப்பெயர் : தமிழ்(Tamil)
(Course Title)

பாடக் குறியீடு : BFTMS-21
(Course Code)

பாட கற்றல் அளவெண் : 4
(Course Credits)

பாட நோக்கங்கள்

1. தமிழ் இலக்கியங்களை அறிமுக நோக்கில் எடுத்துரைத்தல்
2. மொழித்திறன், மொழியறிவு, இலக்கியப்பொது அறிவுபெறும்வகையில் விவரித்தல்

பாடத்திணைப் படிப்பதால் விளையும் பயன்கள்

1. தமிழ் உரைநடை பற்றியும், ஜெயகாந்தனின் சிறுகதைகள் பற்றியும் எடுத்துரைப்பர்.
2. தமிழ் பற்றியும் அலுவலகத் தொடர்பு மடல்கள் எழுதுவது எப்படி என்பது பற்றியும், மொழியை திறம்பட எவ்வாறு பயன்டுத்துவது என்பது பற்றியும் எடுத்துரைப்பர்.

பிரிவு - 1

ஜெயகாந்தனின் "நான் இருக்கிறேன்" - சிறுகதை

தமிழ் உரைநடையில் சிறுகதை வளர்ச்சி - தமிழில் கதை இலக்கியத் தோற்றம், தமிழ்ச் சிறுகதைகளின் தோற்றமும் வளர்ச்சியும், சிறுகதை இலக்கணம் - தமிழ்ச் சிறுகதைகளில் ஜெயகாந்தன் - ஜெயகாந்தன் சிறுகுறிப்பு - கதை அரங்கம் அறிமுகம், நான் இருக்கிறேன் கதைச் சுருக்கம் - நான் இருக்கிறேன் சிறுகதை - வியாதிக்காரன் அனுபவங்கள், சாகக் கற்றுக்கொடுத்த நொண்டி, வாழக் கற்றுக்கொடுத்த வியாதிக்காரன், நான் இருக்கிறேன் அம்மா, - நான் இருக்கிறேன் - சிறுகதைத் திறனாய்வு.

பிரிவு - 2

வா.செ.குழந்தைசாமியின் அறிவியல்தமிழ் ஆக்கம் இற்றைநிலை

அறிவியல்தமிழ் - இயற்றுதல் அறிந்தோம்புணைதல் இல்லை - தமிழில் அறிவியல் இலக்கியம் படைப்போம் - வா.செ. குழந்தைசாமி - அறிமுகம் - அறிவியல்தமிழ் - எந்தத்துறைகளைக் குறிக்கும் - அறிவியல்தமிழை உள்ளடக்கியது - தோற்றம் - கலைச் சொல்லாக்கப்பணி - விடுதலைக்கு முன் - விடுதலைக்குப் பின் - பாடநூல்திறு வனத்தின்பங்கு - பதிப்பகங்களின்பங்கு - பல்கலைக்கழகங்களின்பங்கு

இதழ்களின்பங்கு - இலங்கைத்தமிழரின்பங்கு - கருதவேண்டியவை.

பிரிவு - 3

சமயஇலக்கியக்காலம் (கி.பி.700 - கி.பி 1100)

தமிழில்சமயஇலக்கியங்கள் - சமணஇலக்கியத்தோற்றம் -
பௌத்தஇலக்கியத்தோற்றம் - தமிழில்பௌத்தஇலக்கியங்கள் -
வைணவஇலக்கியங்கள் - சைவஇலக்கியத்தோற்றம் - தமிழில்சைவஇலக்கியங்கள் -
வைணவஇலக்கியத்தோற்றம் - தமிழில்வைணவஇலக்கியங்கள் -
தமிழில்இசுலாமியஇலக்கியங்கள் - தமிழில்கிறிஸ்தவஇலக்கியங்கள்.

பிரிவு - 4

சிற்றிலக்கியக்காலம் (கி.பி. 700 - கி.பி. 1400)

சிற்றிலக்கியத்தோற்றம் - சிற்றிலக்கியவகைகள் - இலக்கணநூல்கள் - உலா -
கலம்பகம் - பரணி - பிள்ளைத்தமிழ் - கோவை - தூது.

பிரிவு - 5

உரையாசிரியர்கள் காலம் (கி.பி. 1200 கி.பி. 1800)

உரைநூல்களின்தோற்றம் - பயன்கள் - உரைவகைகள் - நக்கீரர் - இளம்பூரணர் -
பேராசிரியர் - சேனாவரையர் - நச்சினார்க்கினியர் - கல்லாடர் -
தெய்வச்சிலையார்போன்றோர் - அடியார்க்குநல்லார் - பரிமேலழகர் -
பிரபந்தஉரையாசிரியர்கள் - நன்னூல்உரையாசிரியர்கள் .

பிரிவு - 6

புத்திலக்கியக்காலம் (கி.பி. 1800 - கி.பி 2000)

தமிழில்புதினம் - தமிழில்சிறுகதை - தமிழில்புதுக்கவிதைகள் -
தமிழில்உரைநடைநாடகங்கள் - புதினங்கள் - சிறுகதைகள் - இலக்கியங்கள் -
மரபுக்கவிதைஇலக்கியங்கள் - புதுக்கவிதைஇலக்கியங்கள் -
தமிழில்ஐக்கூக்கவிதைகள்.

பிரிவு - 7

கருத்துப்பரிமாற்றமொழித்திறன்

கருத்துவிளக்கக்கட்டுரைகள் - செய்திக்கட்டுரைகள் - சொற்பொழிவு -
குழுவிவாதங்கள் - நண்பர்களுடன்உரையாடும்திறன் - கணினித்தமிழ் - கட்டுரை -
பெண்ணியம் - தலைப்பு - தேர்ந்தெடுக்கும்முறை - தகவல்கள்சேகரிக்கும்முறை -
தகவல்திரட்டல் - நகைச்சுவைத்திறன் - அவைஅறிதல் - உச்சரிப்புக்கவனம் -
குழுவிவாதஅமைப்பும்குறிக்கோளும் - உரையாடலில் - சுயபுராணம்தவிர்த்தல் -
உடன்படவைக்கும்நாகரிகஉத்தி .

பிரிவு - 8

அலுவலகத்தொடர்புமடல்கள்

நட்புறவுமடல்கள் - வேண்டுகூல்மடல்கள் - குறைதெரிவிக்கும் / புகார்மடல்கள் -
கருத்துமடல்கள் - விண்ணப்பமடல்கள் - அலுவலகத்தொடர்புமடல்கள் -
விண்ணப்பமடலின்படிநிலைகள் - தன்குறிப்புவிவரங்கள் -
விண்ணப்பமடலின்வடிவமைப்பு - விண்ணப்பமடல்எழுதும்முறை - குறிப்பு - வரைவு
- கடிதம் - குறிப்புமடல் - அலுவலகஆணை - நேர்முகக்கடிதம்.

பிரிவு - 9

எழுத்து - சொல்பிழைகளும்திருத்தமும்

ஒலிமயக்கம்தரும்எழுத்துக்கள் - ரஹஒலிமயக்கம் - ந, ன, ண, ஓலிமயக்கம் -
ல, ள, ழ, ஓலிமயக்கம் - சொல்முதலில்வரும்எழுத்துமரபுகள் -

சொல்இடையில்வரும்எழுத்துமரபுகள் - சொற்களின்சந்திப்புமரபுகள் -
வேற்றுமைப்புணர்ச்சியும்அல்வழிப்புணர்ச்சியும் - உயிர்முன்உயிர்முணர்ந்தல் -
குற்றியலுகரப்புணர்ச்சி - வல்லினஒற்றுமிகும்இடங்களும்மிகாஇடங்களும்.

பிரிவு - 10 இலாக்கிய அறிவுவினாவிடை

பாடப்பகுதிதொடர்பானவை - பொதுவானதமிழ்இலக்கியம்தொடர்பானவை.

பார்வை நூல்கள்:

1. மு. வரதராசன், தமிழ் இலக்கிய வரலாறு, சாகித்ய அக்காதெமி, புதுடெல்லி.
2. மது. ச. விமலானந்தன், தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை.
3. தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை.
4. தமிழண்ணல், இனிய தமிழ்மொழியின் இயல்புகள் -1,2,3 பகுதிகள், மீனாட்சி புத்தக நிலையம், மதுரை.
5. முத்து - கண்ணப்பன், தி.. தமிழில் தவறுகளைத் தவிப்போம், பாரிநிலையம், 184, பிராட்வே, சென்னை.
6. கீ. இராமலிங்கனார், தமிழில் எழுதுவோம், கழக வெளியீடு, சென்னை.
7. செ. முத்துவீராசாமி நாயுடு, ஆவணங்களும் பதிவுமுறைகளும், கழக வெளியீடு, சென்னை.
8. டாக்டர் ச. பாலசுப்பிரமணியன், தகவல் தொடர்புக் கல்வி, மாநிலப் பள்ளிசாராக் கல்விக் குருவூலம், சென்னை.
9. எஸ். கலைவாணி, இதழியல் உத்திகள், பராசக்தி வெளியீடு, குற்றாலம்.
10. டாக்டர் அ. சாந்தா, டாக்டர் வீ. மோகன், மக்கள் ஊடகத் தொடர்பியல் புதிய பரிமாணங்கள், மீடியா பப்ளிகேஷன்ஸ், மதுரை.
11. பி.எஸ். ஆச்சார்யா, உயர்வுதரும் உரையாடல்கலை, நர்மதா பதிப்பகம், சென்னை.
12. மு. முத்துக்காளத்தி, பேசுவது எப்படி, கண்ணம்மாள் பதிப்பகம், பாரி நிலையம், சென்னை.



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus - I year - II Semester (Distance Mode)

COURSE TITLE : **Foundation in English-II (Literature and Use of English)**
COURSE CODE : **BFEG- 02**
COURSE CREDIT : **4**

COURSE OBJECTIVES

- To cultivate the creativity among the learners
 - To improve the reading skills of the learners
 - To enhance the vocabulary of the learners
 - To develop pronunciation skills
 - To imbibe the use of internet for developing language skills
-

COURSE OUTCOMES

On successful completion of the Course, the learners will be able to:

- critically evaluate the literary texts
 - read the passages effectively
 - speak with good accent
 - communicate through online
-

Block-1 Literary Texts

Rabindranath Tagore's *Sacrifice* and John Donne's *The Sun Rising*

Block- 2 Reading Comprehension

Reading passages-Preparing a glossary from passage- reading the meaning- respond to questions

Block- 3 Vocabulary and Grammar

Synonyms and Antonyms- Homophones-Making of Nouns-Making of Adjectives-Compound Words-Phrases and Idioms-Words often confused-Spelling- Tenses

Block-4 Pronunciation and Spoken English

Importance of English-Pronunciation: An Exposition-Speech Sounds-Sounds and Spelling: The Relationship-Attributes of Good Speech-Dialogue Situations/Situational Dialogues

Block-5 The Internet English

Email-Chat Groups-Virtual Words-The Web-Commentary

References:

1. *Balasubramanian T. English Phonetics for Indian Students - A Workbook.* 2016.
2. Daniel Jones. *Cambridge English Pronouncing Dictionary.* Cambridge University Press, 2011.
3. Tagore, Rabindranath. *Sacrifice and Other Plays.*Niyogi Books, 2012.

Web Resources:

1. <https://www.poetryfoundation.org/podcasts/75363/the-sun-rising>
2. <https://nptel.ac.in/courses/109/103/109103135/>
3. <https://nptel.ac.in/content/storage2/courses/109106085/downloads/03-%20Phonetics%20and%20Phonology-%20week%203.pdf>
4. <https://nptel.ac.in/courses/109/106/109106085/>
5. <https://nptel.ac.in/courses/109/107/109107172/>



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus - I year- II Semester (Distance Mode)

COURSE TITLE : MECHANICS
COURSE CODE : BPHYS 21
COURSE CREDIT : 5

COURSE OBJECTIVES

While studying the **MECHANICS**, the Learner shall be able to:

CO 1: Describe the Laws of Motion and Collision

CO 2: Explain dynamics of rigid body and compare M.I of a circular ring, disc, solid Sphere

CO 3: Classify the laws of gravitation and Acceleration due to gravity

CO 4: Discuss Central Force Motion and its application

CO 5: Distinguish Static and Fluid dynamics

COURSE SYLLABUS

BLOCK I: Laws of Motion

Laws of conservation of energy, linear momentum and angular momentum -Work energy theorem - work done by gravitational force - work done by spring force. Potential energy - conservative and non-conservative forces - potential energy curve. Collision - Elastic and inelastic collision - (Fundamental laws of impact) - Newton's law of impact - coefficient of restitution - Impact of a smooth sphere on a fixed plane - Direct impact between two smooth spheres. Oblique impact between two smooth spheres - Calculation of final velocities of the spheres - Loss of K.E due to impact.

BLOCK II: Dynamics of Rigid body

Moment of inertia – Theorems of perpendicular and parallel axes- M.I of a circular ring, disc, solid sphere-M.I of a hollow sphere and cylinder about all axes.Compound pendulum – theory – equivalent simple pendulum- Reversibility of centers of oscillation and suspension – determination of g and k

BLOCK III: Gravitation

Newton's law of gravitation – Kepler's laws of gravitation – Universal Constant G by Boy's method – Mass and density of earth - Acceleration due to gravity – Variation of g with altitude, depth and rotation of earth - Value of g at poles and equator. Gravitational field – Gravitational potential – Gravitational potential due to spherical shell – Gravitational potential due to a solid sphere (inside and outside)

BLOCK IV: Central Force Motion

Angular velocity, angular momentum and K.E of rotation. Torque and angular acceleration – Relation between them – Expression for acceleration of a body rolling down an inclined plane without slipping. Center of mass –velocity and acceleration of centre of mass – determination of motion of individual particle. System of variable mass - Rocket motion-Satellite

BLOCK V: Statics and Hydrodynamics

Friction-laws of friction-angle of friction-cone of friction. Centre of gravity-solid and hollow tetrahedron-solid and hollow hemisphere –Centre of pressure – vertical rectangular lamina – vertical triangular lamina.

Hydrodynamics - Equation of continuity–Pitot's tube and Venturimeter – Euler's equation of unidirectional flow – Torricelli's theorem – Bernoulli's theorem and its applications.

Books for Study:

1. Mechanics – Part I and II by Narayanamoorthy, National Publishing Company.
2. Mechanics by D.S.Mathur, S.Chand & Co., 2nd Edition (2001).

3. Mechanics by P. Duraipandian, LaxmiDuraipandian, MuthamizhJayapragasam,
4. S.Chand & Co., New Delhi (1988).
5. Properties of Matter by R.Murugesan, S. Chand & Co., New Delhi (2001).

Books for Reference:

1. Fundamentals of Physics by D. Halliday, R.Rensick and J. Walker, 6th edition, Wiley, NY (2001).

Web Resource

1. [NPTEL :: Basic courses-Sem 1 and 2 - ClassicalPhysics](#)
2. [TheFeynmanLecturesonPhysicsVol.ICh.10:ConservationofMomentum\(caltech.edu\)](#)
3. [Conservation of energy \(video\) | KhanAcademy](#)
4. [NPTEL :: Mechanical Engineering - Dynamics ofMachines](#)

COURSE OUTCOMES

After completion of the **MECHANICS**, the Learner will be able to:

- CLO 1: Analyze conservative and non-conservative forces and Elastic and inelastic Collision
- CLO 2: Estimate the moment of inertia of rigid bodies and describe compound Pendulum
- CLO 3: Apply Kepler's law to describe the motion of planets and satellites in circular orbit, through the study of the law of Gravitation.
- CLO 4: Distinguish the Torque and angular acceleration and estimate acceleration of a body rolling down an inclined plane without slipping,
- CLO 5: Interpret laws of friction, angle of friction and cone of friction, and discuss Bernoulli's theorem and its applications.
-



COURSE TITLE : **ALLIED MATEMATICS - II**
COURSE CODE : **BMSSA 22**
COURSE CREDIT : **4**

COURSE LEARNING OBJECTIVES

While studying the **ALLIED MATEMATICS - II**, the Learner shall be able to:

CO 1: Discuss concepts beta and gamma integrals.

CO 2: To introduce problem solving skills using Numerical Methods.

CO 3: Demonstrate the concept of change of order of integration for two variables.

CO 4: To impart the knowledge of Laplace transform and its properties.

CO 5: To teach statistical tools using correlation.

COURSE SYLLABUS

BLOCK- I: Beta, Gamma Integrals

- 1.1 Definitions of Beta and Gamma Integrals
- 1.2 Recurrence Formula for Gamma Functions
- 1.3 Properties of Beta Functions
- 1.4 Relation between Beta and Gamma Functions

BLOCK -II: Numerical Differentiation and Integration

- 2.1 Finite Differences- Forward and Backward
- 2.2 Derivatives using Newton's Forward Difference Formula
- 2.3 Derivatives using Newton's Backward Difference Formula
- 2.4 Numerical Integration using Trapezoidal Rule
- 2.5 Numerical Integration using Simpsons rule

BLOCK -III: Multiple Integrals

- 3.1 Definitions of Double and Triple Integrals
- 3.2 Change of Order of Integration for Two Variables
- 3.3 Double Integrals and Triple Integrals in Cartesian Coordinates

BLOCK- IV: Laplace Transform

- 4.1 Definition and Transform of $f'(t)$ & $f''(t)$
- 4.2 Laplace Transform of Functions e^{-at} , $\cos at$, $\sin at$, and t^n where 'n' is a Positive Integer
- 4.3 First Shifting Theorem - Laplace Transform of $e^{-at} \cos bt$, $e^{-at} \sin bt$ and $e^{-at} t^n$
- 4.4 Inverse Laplace Transform
- 4.5 Solving Second Order Differential Equations with Constant Coefficients using Laplace Transform

BLOCK -V: Statistics

- 5.1 Correlation
- 5.2 Scatter diagram and its uses
- 5.3 Karl Pearson's Coefficient of Correlation
- 5.4 Correlation coefficient for a Bivariate Frequency Distribution
- 5.5 Probable error of correlation coefficient
- 5.6 Spearman's rank correlation coefficient
- 5.7 Merits and demerits of rank correlation coefficient

BOOKS FOR STUDY

1. Narayanan S. and Manicavachagam Pillay T.K., Calculus-Vol II. Chennai: S.Viswanathan, 2012.
Chapter 7 Sec. 2.1, 2.3, 3 - 5
2. Narayanan S., R. Hanumantha Rao,T.K. Manicavachgam Pillay, and P. Kandaswamy.,
Ancillary Mathematics – Volume – II. Madras.: Viswanathan, S, 1995 Reprint 2011.
Chapter 3 Sec 1 - 3
Chapter 7 Sec 1 – 6
3. R. S. N. Pillai and V. Bagavathi, Statistics, S. Chand & company Ltd, New Delhi, 2007. Chapter 12: Page No: 363 – 395.
4. Sastry S.S., Introductory Methods of Numerical Analysi., Prentice – Hall of India Private Limited :New Delhi(2000).
Chapter 3 : Sections 3.3, 3.3.1, 3.3.2
Chapter 5 : Sections 5.1, 5.2(Numerical differentiation only), 5.4, 5.4.1, 5.4.2, 5.4.3

BOOKS FOR REFERENCE

1. Gupta B.D., Numerical Analysis. Delhi:Konark Publishers pvt. Ltd. , 1999
2. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons, 2007 Reprint 2014
3. Jeffrey Alan, Handbook of Mathematical formulas and Integrals, United States: Academic, 2004.
4. Narayanan S. & T.K. Manicavachagam Pillay, Calculus-Vol I, Madras: S. Viswanathan, 1997.
5. Vedamurthy, V.N., N. Ch. S. N. Iyengar. Numerical Methods. Delhi : Vikas Publishing House, 1998.

Web Resource:

https://www.youtube.com/watch?v=9_m36W3cK74

<https://www.youtube.com/watch?v=JeFGc6SpyRg>

<https://www.youtube.com/watch?v=GdUNs6r57Ik>

<https://www.youtube.com/watch?v=OMc7nI1CzKE>

<https://www.youtube.com/watch?v=CXwE01B9m7Q>

<https://www.youtube.com/watch?v=7EqRRuh-5Lk>

<https://www.youtube.com/watch?v=ZN2PfqZ4ihM>

<https://www.youtube.com/watch?v=ZIn1rgZVPFw>

<https://www.youtube.com/watch?v=8FxMAeiDgws>

<https://www.youtube.com/watch?v=EDVJotmT584>

<https://www.youtube.com/watch?v=11c9cs6WpJU>

<https://www.youtube.com/watch?v=vv-l0vOayKM>

<https://www.youtube.com/watch?v=0qLKfMm45-4>

COURSE LEARNING OUTCOMES

After completion of the **ALLIED MATHEMATICS -II**, the Learner will be able to:

CLO 1: Describe the relationship between beta and gamma integrals.

CLO 2: To understand problem solving skills using Numerical methods

CLO 3: Enriched the knowledge of multiple integrals and apply it to find the volume and area of the region.

CLO 4: Analyse and apply Laplace transform techniques in appropriate Physical problems.

CLO 5: Recognize the problems and solving it using correlation.



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus -I year -II Semester (Distance Mode)

COURSE TITLE : PRACTICAL - I
COURSE CODE : BPHYS -P1
COURSE CREDIT : 4

ANY TWELVE EXPERIMENTS ONLY

COURSE OBJECTIVES

While studying the **PRACTICAL - I**, the Learner shall be able to:

- CO 1: Describe the Measurement of surface tension, viscosity and heat capacity of liquids.
- CO 2: determine the Modulus of elasticity measurement by dynamic methods.
- CO 3: Verify the three laws of transverse vibrations in stretched strings.
- CO 4: Demonstrate the principle and working of Spectrometer hence find refractive index of a material.
- CO 5: Calibrate low range ammeter using potentiometer

COURSE LEARNING OUTCOMES

After completion of the **PRACTICAL - I**, the Learner will be able to:

- CLO 1: Define the aim of the experiment and explain the various parameters in the formula that is used to estimate the physical property of a material. Identify the equipment and get the accessories.
- CLO 2: Arrange and assemble the gadgets and carry out the experiment.
- CLO 3: List the observations and repeat the experiment to find the average and hence determine the physical quantity by making use of the required formula.
- CLO 4: Interpret and report the result and classify the materials based on the

Measurement(or) verify a given law. Sketch the variations wherever required.

CLO 5: Analyze the results of the experiment with an aim to construct or design an equipment or a device for use in project work/research work.

6. Viscosity by Capillary flow method
7. Compound Pendulum – Determination of g and K .
8. Sonometer – Frequency of A.C.
9. Spectrometer – Refractive index of the prism.
10. Newton's law of cooling – Specific heat capacity of the liquid.
11. Newton's rings-determination of radius of curvature of the lens R .
12. Meter bridge – determination of specific resistance.
13. Young's modulus – Uniform – Scale and telescope.
14. Young's modulus – Uniform – Pin and microscope.
15. Surface tension by capillary rise method.
16. Comparison of surface tension by capillary rise method.
17. Lee's disc –specific heat capacity of the bad conductor.
18. Focal length – Concave lens – Combination method (Two types)
19. Spectrometer –Dispersive Power of the prism.
20. Potentiometer – Internal resistance of cells.
21. Air Wedge – Thickness of Wire.
22. Moment of magnet – Tan C Position
23. Melde's Strings – Frequency of Vibrator.

Web Resources

1. <https://vlab.amrita.edu/?sub=1&brch=280&sim=1518&cnt=4>
2. <https://rb.gy/9e5mrd>
3. <https://rb.gy/m7aiog>
4. <http://htv - au.vlabs.ac.in/heat>
5. thermodynamics/Newtons_Law_of_Cooling/experiment.html
6. <https://rb.gy/isiyfm>
7. <https://rb.gy/ysfsgv>
8. [Coefficient of Viscosity of Water | Poiseuille's method | Experiment - YouTube](#)

9. [PHY 104 | Physics Lab | Exp-04 | Determination of the value of \$g\$, by means of a compound pendulum - YouTube](#)
10. [SONOMETER EXPERIMENT || FREQUENCY OF AC MAINS USING SONOMETER || SONOMETER PRACTICAL | WITH PDF FILE - YouTube](#)
11. [Physics Lab Demo: Refractive Index of the Prism - YouTube](#)
12. [Determination of specific heat of a liquid by Newton's laws of cooling - YouTube](#)
13. [Experiment-Newton's Rings Method \(Radius of Curvature of Lens\) - YouTube](#)
14. [Meter Bridge Determination Of Specific Resistance Experiment Edunovus Online Smart Practicals - YouTube](#)
15. [Youngs Modulus Uniform Bending - YouTube](#)
16. [Youngs Modulus \(Uniform Bending\) - YouTube](#)
17. [Surface Tension of liquid by capillary rise method | Bsc Physics lab experiment - YouTube](#)
18. [Lee's' Disc Method Experiment - Physics Practical - YouTube](#)
19. [Dispersive power of Prism Experiment - YouTube](#)
20. [To find the Focal Length of a Concave Lens with the help of a Convex Lens - YouTube](#)
21. [Potentiometer experiment\(Internal resistance of a cell using potentiometer\)by Anshu Kapoor - YouTube](#)
22. [Air wedge experiment - Thickness of the thin wire. - YouTube](#)
23. [Deflection Magnetometer - YouTube](#)
24. [Melde's experiment - standing waves on a vibrating string - YouTube](#)



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus - I year- II Semester (Distance Mode)

COURSE TITLE : ENVIRONMENTAL STUDIES
COURSE CODE : CCES
COURSE CREDIT : 2

COURSE OBJECTIVES

While studying the **ENVIRONMENTAL STUDIES**, the Learner shall be able to:

- To help students to gain the fundamental knowledge of the environment
 - To create in students an awareness of current environmental issues
 - To inculcate in students an eco-sensitive, eco-conscious and eco-friendly attitude.
-

COURSE OUTCOMES

After completion of the **ENVIRONMENTAL STUDIES**, the Learner will be able to:

- Articulate the interdisciplinary context of environmental issues
 - Adopt sustainable alternatives that integrate science, humanities and social perspectives
 - Appreciate the importance of biodiversity and a balanced ecosystem
 - Calculate one's carbon print
-

Block: 1

The Multi-disciplinary nature of environmental studies - Definition, scope and importance - Need for public awareness.

Block :2

Natural Resources - Renewable and non-renewable resources - Natural resources and associated problems.

- a. Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
- b. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams – benefits and problems.
- c. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- d. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity case studies.
- e. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.
- f. Land resources: Land as a resource, land degradation, man-induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources - Equitable use of resources for sustainable lifestyles.

Block :3

Ecosystems - Concept of an ecosystem - Structure and function of an ecosystem - Producers, consumers and decomposers - Energy flow in the ecosystem - Ecological succession - Food chains, food webs and ecological pyramids - Introduction, types, characteristic features, structure and function of the following ecosystem:-

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Block :4

Biodiversity and its conservation - Introduction - Definition : genetic, species and ecosystem diversity - Biogeographical classification of India - Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values -

Biodiversity at global, National and local levels - India as a mega - diversity nation - Hot-spots of biodiversity - Threats to biodiversity : habitat loss, poaching of wildlife, man wildlife conflicts - Endangered and endemic species of India - Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

Block :5

Environmental Pollution - Definition - Causes, effects and control measures of : Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards - Solid waste Management - Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution - Pollution case studies - Disaster management: floods, earthquake, cyclone and landslides.

Block :6

Social issues and the Environment - From Unsustainable to Sustainable development - Urban problems related to energy - Water conservation, rain water harvesting, watershed management - Resettlement and rehabilitation of people; its problems and concerns. Case studies - Environmental ethics: Issues and possible solutions - Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies - Wasteland reclamation - Consumerism and waste products - Environment Protection Act - Air (Prevention and Control of Pollution) Act - Water (Prevention and control of Pollution) Act - Wildlife Protection Act - Forest Conservation Act - Issues involved in enforcement of environmental legislation - Public awareness.

Block :7

Human Population and the Environment - Population growth, variation among nations - Population explosion - Family Welfare Programme - Environment and human health - Human Rights - Value Education - HIV / AIDS - Women and Child Welfare - Role of Information Technology in Environment and human health - Case Studies.

Reference:

1. Carson, R.2002.Slient Spring, Houghton Mifflin Harcourt.
2. Gadgil, M.,&Guha,R. 1993. This Fissured Land: An Ecological History of India,

- Univ. Of California Press.
3. Glesson, B. And Law, N.(eds.)1999, Global Ethics and Environment, London, Routledge.
 4. GliECK,P.H.1993.Water Crisis, Pacific Institute for Studies in Dev. Environment & Security, Stockholm Env. Institute, Oxford Univ. Press.
 5. Groom, Martha J., Gary K.Meffe, and Carl Ronald Carroll, Principles of Conservation Biology. Sunderland: Sinauer Associate, 2006.
 6. Grumbine.R.Edward, and Pandit,M.k.2013.Threats from India's Himalayas dams.Science,,339:36-37
 7. McCully,P.1996.Rivers no more :the environmental effects of dams(pp.29.64).Zed books.
 8. McNicill John R.2000.Something New Under the Sun: An Environmental History of the Twentieth Century.
 9. Odum,E.P..Odum, H.T.& Andrees.J.1971.Fundamenetal of Ecology, Philadelphia Saunders.
 10. Pepper.J.J...Gerba.C.P. & Brusseau.M.L.2011.Environmental and Pollution Science. Academic Press.
 11. Rao.M.N.& Datta,A.K 1987.Waste Water Treatment, Oxford and IBH Publishing Co.Pvt.Ltd.
 12. Raven,P.H..Hassenzahl,D.M & Berg.L.R..2012 Environment.8th edition.John Willey & sons.
 13. Rosencranz., A.. Divan,S.& Noble, M.L.2001.Environmental law and policy in India, Tirupathi 1992.
 14. Sengupta,R.2003.Ecology and Economics: An approach to sustainable development. OUP
 15. Singh.J.S..Singh..S.P and Gupta,.S.R.2014.Ecology E nvironmental Science and Conservation, S.Chand Publishing .New Delhi .
 16. Sodhi,N.S..Gibson.I.&Raven,P.H(EDS).2013.Conservation Biology :Voices from the Tropics.John Willey & Sons.
 17. Thapar,V.1998.Land of the Tiger: A Natural History of the Indian Subcontinent.
 18. Waren,C.E.1971.Biology and water Pollution Control. WB Saunders.
 19. Wilson.E.O.2006. The Creation: An appeal to save life on earth.New York: Norton.
 20. World Commission on Environment and Development.198.Our Common Future. Oxford University Press.



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus - II year - III Semester (Distance Mode)

பாடப்பெயர் : தமிழ் -Tamil
(Course Title)

பாடக் குறியீடு : BFTMS-31
(Course Code)

பாட கற்றல் அளவெண் : 4
(Course Credits)

பாட நோக்கங்கள்

1. தமிழிலுள்ள சங்க இலக்கியம், காப்பிய இலக்கியம், நீதி இலக்கியம் குறித்து அறிமுக நிலையில் மாணவர்களுக்கு அறிமுகம் செய்வதோடு, தமிழ் இலக்கிய வரலாறு குறித்தும் அறிமுகம் செய்தல்

பாடத்திணைப் படிப்பதால் விளையும் பயன்கள்

1. தமிழிலுள்ள சங்க இலக்கியம், காப்பிய இலக்கியம், நீதி இலக்கியம் குறித்து அறிமுக நிலையில் மாணவர்களுக்கு அறிமுகம் செய்வதோடு, தமிழ் இலக்கிய வரலாறு குறித்தும் எடுத்துரைப்பார்கள். அறிமுகம் செய்தல்.

பிரிவு - 1 எட்டுத்தொகை - புறநானூறு

எட்டுத்தொகை அறிமுகம் - புறநானூறு - அதியமான் நெடுமானஞ்சியை ஓளவையார் பாடியது(புறம். 91) - வேள் பாரியைக் கபிலர் பாடியது (புறம். 107) - வையாவிச் கோப்பெரும்பேகனைப் பரணர் பாடியது (புறம். 142) - பாண்டியன் ஆரியப்படை கடந்த நெடுஞ்செழியன் பாடல் (புறம். 183) - சேரமான் கணைக்கால் இரும்பொறை பாடல் (புறம். 74) - பொன்முடியார் பாடல் (புறம். 312) - ஓளவையார் பாடல் (புறம். 91) - பெருங்கோப்பெண்டு பாடல் (புறம். 248)- கணியன் பூங்குன்றனார் பாடல் (புறம். 192) - நரிவெருடத்தலையார் பாடல் (புறம். 195) - தொடித்தலை விழுத்தண்டினார் பாடல் (புறம். 243) - பூதப்பாண்டியன் மனைவி பெருங்கோப்பெண்டு பாடல் (புறம். 248)

பிரிவு - 2 நற்றிணை, குறுந்தொகை

அகத்திணை பாடல்கள் - அன்பின் ஐந்திணை - நற்றிணை - குறுந்தொகை - பாடப்பகுதி - நற்றிணையில் குறிஞ்சி (1) - முல்லை (142) - மருதம் (210) - நெய்தல் (172) - பாலை (284) - குறுந்தொகையில் குறிஞ்சி (40) - முல்லை (167) - மருதம் (8) - நெய்தல் (290) - பாலை(135).

பிரிவு - 3

கலித்தொகை

கலித்தொகை - ஐந்திணை பாடிய புலவர்கள் - பாலைக்கலி (9)- பாலைபாடிய பெருங்கடுங்கோ - குறிஞ்சிக்கலி கபிலர் பாடல்(51) - நெய்தல்கலி நல்லந்துவனார் பாடல் (133).

பிரிவு - 4

பத்துப்பாட்டு - நெடுநல்வாடை

பத்துப்பாட்டு அறிமுகம் - நெடுநல்வாடை - இரண்டு களம் கொண்ட நாடகம் போன்றது - நெடுநல்வாடை - அகமா புறமா? - வாடைக்கால வருணனை - அரண்மனைத் தோற்றம் - அந்தப்புர அமைப்பு - அரசியின் இல்லமும் படுக்கையும் - புனையா ஓவியம் கடுப்ப அரசி - தோழியர், செவிலியர் அரசியை ஆற்றுதல் - உரோகினியை நினைத்து அரசியின் பெருமுச்சு - பாசறையில் அரசன் - முன்னோன் முறைமுறை காட்டல் - நள்ளென் யாமத்தும் பள்ளிக்கொள்ளான் - நெடியவாடை - பிரிவுத்துயர்ப்படும் அரசிக்கு - பாசறையில் பணிகொட்டும் இரவிலும் தூங்காமல் புண்பட்ட வீரரைப் பார்க்கவந்த அரசனுக்கு நெடுநல்வாடை பெயர்ப்பொருத்தம்.

பிரிவு - 5

திருக்குறள்

பதினென்கீழ்க்கணக்கு - அறிமுகம் - திருக்குறள் - முப்பால் - பாடப்பகுதி - தீமையிலாத சொல்லுதல் வாய்மை - நெஞ்சமும் வாய்மையும் - வாய்மை எல்லா அறமும் தரும் - அகம் தூய்மை - முயற்சிப்பது சிறப்பு - முயற்சியில்லாதவனது நன்மை - வறுமைக்குக் காரணம் - முயற்சி விடற்பாலது அன்று - தலைவியின் குறிப்பினைத் தலைவன் அறிதல் - நாணமும் மகிழ்ச்சியும் அறிதல் - அயலவர்போல் சொல்லினும் குறிப்பறிதல் - அவள் நகைப்பின் நன்மைக் குறிப்பு - தோழி தனக்குள்ளே சொன்னது.

பிரிவு - 6

நாலடியார், பழமொழி நானூறு

செல்வம் சகடக்கால் போல வரும் - பெண் கல்வி - கல்வி அழகே அழகு - கல்வி கரையில் கற்பவர் நாள்சில - நாய் அனையார் கேண்மை - கால்கால்நோய் காட்டுவர் பொதுமகளிர் - குலவிச்சை கல்லாமல் பாகம்படும் - நாய் பெற்ற தெங்கம் பழம் - நுணலும் தன் வாயால் கெடும் - நிறைகுடம் நீர்த்நும்பல் இல் - இறைத்தோறும் ஊறும் கிணறு

பிரிவு - 7

ஏலாதி, திரிகடுகம், ஆசாரக்கோவை

அன்புடையார்க்கு உள்ள ஆறு குணம் - எழுத்தின் வனப்பே வனப்பு - யாருக்கெல்லாம் ஈதல் வேண்டும்? திரிகடுகம் போலும் மருந்து - இம்மூன்றும் நன்மை பயத்தல் இல - இவர் மூவர் பெய் எனப் பெய்யும் மழை - முந்தையேநூற்

கண்ட முறை - என்றும் அசையாத உள்ளத்தவர் - திறத்துளி வாழ்தும் என்பார் - பேதைகள் அல்லார் புகாஅர்.

பிரிவு - 8 இன்னா நாற்பது, இனியவை நாற்பது

கடனுடையார் காணப் புகல் - உணர்வார் உணராக்கடை - யாம் என்பவரொடு நட்பு - இளமையுள் மூப்புப் புகல் - தொன்மை உடையார் கெடல் - எனைமாண்பும் தான் இனிது - ஈதல் எத்துணையும் ஆற்ற இனிது - திறம்தெரிந்து வாழ்தல் இனிது - அறிந்துஉரைத்தல் ஆற்ற இனிது - கற்றலின் காழ் இனியது இல்.

பிரிவு - 9 சிலப்பதிகாரம் - கனாத்திறம் உரைத்த காதை

சிலப்பதிகாரம் - அமைப்பியல் விளக்கம் - காப்பியக் கதைச் சூழல் - காதையின் கதைச்சுருக்கம் - அகனகர் வருணனை - மாலதி பாலளிக்கப் பாலகன் சோர்தல் - பாசண்டச் சாத்தற்குப் பாடு கிடந்த மாலதி - இடுபிணம் தின்னும் இடாகினிப் பேய் - பாசண்டச் சாத்தனின் அருளுதவி - தேவந்தி கதை - கண்ணகி தான்கண்ட கனவுரைத்தல் - பீடு அன்று - கோவலன் வருகை - சிலம்புள கொண்ம்.

பிரிவு - 10 மணிமேகலை - ஆபுத்திரன் திறம் அறிவித்த காதை

மணிமேகலை கர்ப்பிய அமைப்பு - முன்கதைச் சுருக்கம் - கதை நிகழும் சூழல் - காதையின் கதைச்சுருக்கம் - அபஞ்சிகள் மனைவி சாலி ஈன்ற குழவி - ஆ பாலுட்டி வளர்த்தல் - ஆ மகன் அல்லன் என் மகன் - ஆபுத்திரன் கல்வி கற்றல் - புலைசூழ வேள்வி - நள்ளிருளில் கொண்டு நடக்குவன் - நீ மகன் அல்லாய் நிகழ்ந்ததை உரையாய் - இதனொடு வந்த செற்றம் என்னை - சிறியை நீ, அவ ஆமகன் அதற்கு ஒத்தனை - ஆவொடு வந்த அழிகுலம் உண்டோ?.

பார்வை நூல்கள்:

1. புறநானூறு மூலமும் உரையும், (இரண்டு தொகுதிகள்) ஓளவை சு. துரைசாமிப்பிள்ளை உரை, கழக வெளியீடு, சென்னை.
2. நற்றிணை மூலமும் உரையும், (இரண்டு தொகுதிகள்) ஓளவை சு. துரைசாமிப்பிள்ளை உரை, அருணா பப்ளிகேஷன்ஸ், 13-1 உஸ்மான் சாலை, சென்னை.
3. குறுந்தொகை மூலமும் உரையும், டாக்டர் உ.வே. சாமிநாதையர் உரை, கவீர் அறக்கட்டளை, சென்னை.
4. கலித்தொகை மூலமும் உரையும், பெருமழைப்புலவர் பொ.வே. சோமசுந்தரனார் உரை, கழக வெளியீடு, சென்னை.
5. நெடுநல்வாடை மூலமும் உரையும், பெருமழைப்புலவர் பொ.வே. சோமசுந்தரனார் உரை, கழக வெளியீடு, சென்னை.
6. திருக்குறள் - பரிமேலழகர் உரையுடன், ஸ்ரீ காசி மடம், திருப்பனந்தாள்.
7. பதினென்கீழ்க்கணக்கு, நியூசெஞ்சுரி புக் ஹவுஸ் பிரைவேட் லிமிடெட், சென்னை.
8. மு. வரதராசன், தமிழ் இலக்கிய வரலாறு, சாகித்ய அக்காதெமி, புதுடெல்லி,
9. மது. ச. விமலானந்தன், தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை. 51

10. தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை.



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus - II year - III Semester (Distance Mode)

COURSE TITLE : Foundation in English-III (Soft Skills)

COURSE CODE : BFEGS- 31

COURSE CREDIT : 4

COURSE OBJECTIVES

- To cultivate the positive mind
 - To improve body language
 - To develop interview skills
 - To prepare a comprehensive CV
 - To enhance interpersonal skills
-

COURSE OUTCOMES

On successful completion of the Course, the learners will be able to:

- approach the life positively
 - communicate in good manner
 - join in a team in working place
 - develop an impressive CV
 - express managerial skills
-

Block-1 Introduction to Soft Skills

Soft Skills: An Introduction - Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skill Development- Self-Discovery: Discovering the Self; Setting Goals; Beliefs, Values, Attitude, Virtue. 3. Positivity and Motivation: Developing Positive Thinking and Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels.

Block-2 Body Language & Etiquettes

Non-Verbal Communication: Importance and Elements; Body Language- Social and

Business.

Block-3 Group Discussion& Interview Skills

Interviewer and Interviewee - in-depth perspectives- Before, During and After the Interview- Tips for Success- Meaning, Types and Models, Group and Ethical Decision-Making, Problems and Dilemmas in application of these skills

Block-4 Preparation of Curriculum Vitae' (CV)

Definition of CV and its purposes- CV versus Resume- Rules- Covering Letter

Block-5 Emotional Intelligence Skills

Meaning, History, Features, Components, Intrapersonal and Management Excellence; Strategies to enhance Emotional Intelligence.

References:

1. Dhanavel S.P. *English and Soft Skills*. Orient Blackswan India, 2010.
2. Ghosh B.N. (Ed.) *Managing Soft Skills for Personality Development*. McGraw Hill India, 2012.

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc19_hs33/preview
2. <https://nptel.ac.in/courses/109/107/109107121/>



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus - II year - III Semester (Distance Mode)

COURSE TITLE : OPTICS AND SPECTROSCOPY
COURSE CODE : BPHYS 31
COURSE CREDIT : 5

COURSE OBJECTIVES

While studying the **OPTICS AND SPECTROSCOPY**, the Learner shall be able to:

CO 1: Describe the concept of lens and prism

CO 2: Explain the Theory and applications of Interference of light

CO 3: Discuss fundamentals of diffraction and Resolving Power

CO 4: Explain the phenomena of polarization along with its applications

CO 5: Classify the types of spectroscopies

COURSE SYLLABUS

BLOCK I: Geometrical optics

Lens - Spherical aberration in lenses - Methods of minimizing spherical aberration. Chromatic aberration in lenses - condition for achromatism of two thin lenses (in and out of contact) -Aplanatic lens - Dispersion - Angular and Chromatic dispersion - combination of prisms to produce i)dispersion without deviation ii) deviation without dispersion. Direct vision spectroscope -Eyepieces - Ramsden's and Huygens's eyepieces -simple microscope (magnifying glass) - compound microscope.

BLOCK II: Interference

Conditions for interference - Theory of interference fringes - interference due to reflected light (thin films) -colours of thin films - Wedge shaped thin film - Air wedge- theory - determination of diameter of a thin wire by Air wedge - test for

optical flatness. Newton's rings by reflected light - Determination of wavelength of light. Michelson's Interferometer - theory and its Application (Measurement of wavelength) - Jamin's interferometers - determination of refractive index of gases.

BLOCK III: Diffraction

Fresnel's and Fraunhofer diffraction - Rectilinear propagation of light - zone plate - action of zone plate - diffraction at circular aperture - opaque circular disc - Fraunhofer diffraction at single slit - Double slit. Plane diffraction grating - theory of plane transmission grating - experiment to determine wavelength (Normal incidence method). Resolving power - Rayleigh's criterion for resolution - resolving power of a telescope - resolving power of a microscope - resolving power of a prism - resolving power of grating.

BLOCK IV: Polarisation

Double refraction - Nicol Prism - Nicol Prism as polarizer and analyzer - Huygens's explanation of double refraction in uniaxial crystals - Plane, elliptically and circularly polarized light. Quarter wave plates and Half wave plates - Production and detection of plane, circularly and elliptically polarized light. Optical activity - Fresnel's explanation of optical activity - Specific rotatory power - Laurent's half shade polarimeter.

BLOCK V: Spectroscopy

Infrared spectroscopy - sources and detector - uses. Ultraviolet spectroscopy - sources - quartz spectrograph - applications. Raman Spectroscopy - Quantum theory of Raman effect - applications - Nuclear magnetic resonance - Nuclear quadrupole resonance -- Electron spin resonance spectroscopies - (Qualitative study)

Books for Study:

1. A text book of Optics - Subramanyam and Brijlal, S. Chand and co., 25th Edition, New Delhi 2004.
2. Optics and Spectroscopy - R. Murugesan, S. Chand and co., 6th Edition, New Delhi, 2008.
3. Elements of Spectroscopy - S.L. Gupta, V. Kumar and R.C. Sharma Pragati Prakashan, 13th Edition, Meerut, 1997.

4. Molecular structure and spectroscopy – G.Aruldhass, PHI Pvt Ltd, , II Edition, New Delhi, 2007.

Books for Reference:

1. Optics – Sathyaprakash, Ratan Prakashan Mandhir, VIIth Edition, New Delhi, 1990.
2. Introduction to Molecular Spectroscopy –C.N.Banewell, TMH publishing co. IV Edition, New Delhi, 2006.
3. Ajoy Ghatak, *Optics*, (TMH), New Delhi, Fourth edition, 2009.
4. *Optics and Atomic Physics*, Singh & Agarwal, Pragati Prakashan Meerut, Ninth edition, 2002.
5. Fundamentals of Physics, by D.Halliday, R. Resnick and J. Walker, Wiley, 6th Edition, New York (2001).

Web Resources

1. <https://rb.gy/pfsd4a>
2. <https://rb.gy/p1tnhi>
3. <https://rb.gy/eq4tba>
4. <https://rb.gy/lkyewf>
5. <https://rb.gy/jpasef>
6. <https://rb.gy/d1bwpf>
7. <https://rb.gy/lswiij>
8. <https://open.umn.edu>

COURSE OUTCOMES

After completion of the **OPTICS AND SPECTROSCOPY**, the Learner will be able to:

CLO 1: Interpret the Methods of minimizing spherical aberration, Chromatic aberration in lenses and Angular and Chromatic dispersion in prism.

CLO 2: Analyze the interference due to reflected light and determine the wavelength

of light and thickness of thin film using Michelson's interferometer.

CLO 3: Distinguish resolving power of a microscope, prism and grating.

CLO 4: Differentiate the different types of polarized light and Describe Optical Activity

CLO 5: Compare Infrared spectroscopy, Ultraviolet spectroscopy, and Raman

Spectroscopy and its applications



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus - II year - III Semester (Distance Mode)

COURSE TITLE : HEAT AND THERMODYNAMICS
COURSE CODE : BPHYS 32
COURSE CREDIT : 5

COURSE OBJECTIVES

While studying the **HEAT AND THERMODYNAMICS**, the Learner shall be able to:

CO 1: Describe the fundamentals of Thermometry and Calorimetry

CO 2: Explain Low Temperature Physics and its applications

CO 3: Discuss the basics of Transmission of Heat and its applications

CO 4: Interpret the Kinetic Theory of gases.

CO 5: Classify the laws of thermodynamics and its applications

COURSE SYLLABUS

BLOCK I : Thermometry and Calorimetry

Platinum resistance thermometer - Callendar and Griffith's bridge. Thermoelectric effect - Seebeck effect - Thermoelectric thermometers- International temperature scale - Thermistor.

Specific heat capacity of solids - Regnault's method of mixtures(solid) - specific heat capacity of liquids - Callendar and Barnes method - Specific heat capacity of gases - C_p and C_v - Meyer's relation - C_v by Joly's differential steam calorimeter method - C_p by Regnault's method.

BLOCK II : Low Temperature Physics

Joule - Kelvin effect - Liquefaction of Air-Linde's Process. liquefaction of hydrogen - liquefaction of helium-Kammerling - Onne's method - Helium I and II. Lambda point - production of low temperatures - adiabatic demagnetization. Practical

applications of low temperature - refrigerators and air-conditioning machines - super fluidity - application of super fluidity.

BLOCK III: Transmission of Heat

Conduction - coefficient of thermal conductivity - Rectilinear flow of heat along a bar - Convection - lapse rate - Stability of the atmosphere - Newton's law of cooling - determination of specific heat capacity of liquid - Radiation - black body - Kirchhoff's law - Stefan - Boltzmann law - energy distribution in black body spectrum - Wien's law - Rayleigh Jean's law. Planck's law - Solar constant - water flow pyroheliometer.

BLOCK IV: Kinetic Theory of Gases

Kinetic Theory of gases- assumptions - Molecular collisions - mean free path - expression for mean free path - Transport phenomenon. Brownian motion and its features - expression for viscosity, Diffusion and thermal conductivity of gas. Experimental verification - Vander walls equation of state - Determination of Vander walls constant - Relation between Vander Wall's constant and critical constants.

BLOCK V: Thermodynamics

Zeroth and first law of thermodynamics - reversible and irreversible processes. - Isothermal process-adiabatic process-gas equation during adiabatic process - work done during adiabatic and isothermal process - Second law of thermodynamics - Carnot's engine - its efficiency. Entropy - change of entropy in reversible and irreversible processes - temperature - entropy diagrams - physical significance of entropy - change of entropy when ice converted into steam. Third law of thermodynamics - Extensive and Intensive thermodynamic variables - distinction between them. Maxwell thermodynamical relations - derivation and application - Clausius - Clapeyron equation and specific heat relation .

Books for Study:

1. Heat and Thermodynamics - Brijlal and Subramanyam, S.Chand & Co, 16th Edition New Delhi, 2005.

2. Heat and Thermodynamics - D.S. Mathur, Sultan Chand & Sons, 5th Edition, New Delhi, 2014.
3. Thermal Physics - R. Murugesan and Kiruthiga Sivaprasath, S.Chand & Co, II Edition, New Delhi, 2008

Books for Reference:

1. Heat & Thermodynamics - J.B. Rajan, SC Publisher, New Delhi, 1985.
2. Concepts of Physics Volume I and II - H.C. Varma, Bharati Bhawan Publishers, New Delhi, 2015
3. M. Narayanamoorthy and N. Nagarathinam, Heat, National publishing Co, Chennai, Eight edition, 1987.

Web Resources

1. <https://nptel.ac.in/courses/115/106/115106090/>
2. <https://nptel.ac.in/courses/115/106/115106090/>
3. <https://nptel.ac.in/courses/115/106/115106090/>
4. <https://nptel.ac.in/courses/115/106/115106090/>
5. <https://nptel.ac.in/courses/115/106/115106090/>
6. <https://nptel.ac.in/courses/115/106/115106090/>
7. https://www.youtube.com/watch?v=1_InUUX5-LE
8. <https://www.youtube.com/watch?v=E9cOAMhFUz0>
9. <https://www.youtube.com/watch?v=qKMsG6WrR0s>
10. <https://www.youtube.com/watch?v=XooN0w8SDZo>
11. https://www.youtube.com/watch?v=4RX_lpoGRBg
12. <https://www.youtube.com/watch?v=mb8LqNIHeLY>
13. <https://www.youtube.com/watch?v=mb8LqNIHeLY>
14. https://www.youtube.com/watch?v=kSuXS_zqRec&t=55s
15. <https://www.youtube.com/watch?v=N-hWsLSC9Ms>
16. <https://www.youtube.com/watch?v=WTtxlaeC9PY>

COURSE OUTCOMES

After completion of the **HEAT AND THERMODYNAMICS**, the Learner will be able to:

CLO 1: Compare Thermoelectric effect, Seebeck effect and determine the Specific heat

capacity of gases using Joly's differential steam calorimeter method

CLO 2: Discuss the Practical applications of low temperature - refrigerators and air-

conditioning machines

CLO 3: Differentiate Conduction, Convection and Radiation. Determine the specific heat capacity of liquid using Newton's Law of Cooling

CLO 4: Explain the fundamentals of Kinetic Theory of gases, Brownian motion and its

Features.

CLO 5: Apply and analyze Second and Third Laws of Thermodynamics and describe Maxwell thermodynamical relations and their applications



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus - II year - III Semester (Distance Mode)

COURSE TITLE : GENERAL CHEMISTRY - I
COURSE CODE : BCHESA-31
COURSE CREDIT : 4

COURSE OBJECTIVES

While studying the General Chemistry - I course, the student shall be able to:

- Know about the need, types and uses of chemical bonds
- Understand the need, types and uses of organic reactions
- Gain knowledge on the characteristics, types and applications of catalysis
- Study the characteristics, types and applications of biomolecules
- Acquire knowledge on the types and effect of pollutions

COURSE SYLLABUS

Block I: Chemical bonds

Unit-1- Introduction, definition and need of chemical bond.

Unit-2-Types of bonds: Ionic, Covalent, Co-ordinate covalent, Metallic and Hydrogen bond with suitable illustrations.

Block II: Organic reactions

Unit-3-Introduction, definition and example to an Organic reaction-Definition to Nucleophiles and Electrophiles with suitable illustrations.

Unit-4-Types of organic reactions - Addition, Elimination, Substitution, Rearrangement and Polymerization reactions with suitable illustrations.

Block III: Catalysis

Unit-5-Introduction, definition and example to Catalysis and Catalysts- Types of catalysts - Positive, Negative, Homogeneous and Heterogeneous catalysts.

Unit-6-Definition and example to Autocatalysis, Enzyme catalysis and Acid/Base catalysis.

Block IV: Biomolecules - I

Unit-7-Introduction and definition to Carbohydrates - Monosaccharides, Disaccharides and Polysaccharides - classification, properties and structures.

Unit-8-Introduction and definition to Vitamins - classifications - structure, occurrence and deficiency diseases caused by Vitamin A, B complex, C, D, E and K.

Block V: Pollution

Unit-9-Air pollution: definition, sources and effects of air pollutants - effects of fluorocarbons, ozone layer and green-house effect

Unit-10-Water pollution: definition, sources and effects of water pollution - industrial effluents - water sewages - water pollution control - water treatment.

Unit-11-Radioactive pollution: sources, nuclear traces, wastes, effect of radiation and preventive methods.

Text Books:

1. Environmental Chemistry and Green Chemistry by Asim K. Das.
2. Introduction to Chromatography by V.K. Srivastava, K.K. Srivastava. Edition II.
3. Organic Chemistry by Anupa Saha and Anup Pathak, Volume I & II.
4. A text book of Organic Chemistry by Arun Bhal, B.S. Bhal, and S. Chand.
5. Textbook of Pharmaceutical Chemistry and Medicinal Chemistry R. Mukhopadhyah, S. Datta and R.K. Das.
6. A New Concise Inorganic Chemistry by J.D. Lee.
7. Text book of organic chemistry, P.L. Soni.
8. Organic chemistry of Natural Products by Gurdeep Wat, Volume I.
9. A Text book of Medical Biochemistry by S. Ramakrishnan, K.G. Prasanan and R. Rajan.

10. Fundamentals of Biochemistry by J.L. Jain.
11. A Text of Medical biochemistry by AmbikaShanmugam.
12. Principles of Physical Chemistry by Puri, Sharma and Pathania.

Reference Books

1. Fundamentals of Organic Chemistry by T.W.GrahamSolomen, John Wiley & Sons;
4th edition (1994).
2. Principle of organic synthesis- R.O.C. Norman and J. M. Coxon.(ELBS).
3. Advanced organic chemistry (McGraw-Hill) J. March.
4. Inorganic Chemistry, J.E. Huheey, Harper and Collins, NY, IV Edition, (2010).
5. Concise Inorganic Chemistry, J. D. Lee,Wiley; Fifth Edition edition (2016).
6. Principles of Physical chemistry, P.W. Atkins, C.J. Clougston, Longman, (1986).
7. A.K.De, "Environmental Chemistry", New Age International, (2003).
8. R.Shangi, M.M.Srivatsava, "Green Chemistry", Narosa Publishers, New Delhi, (2003).
9. M.Z.Jacobson, Air Pollution and Global Warming 2nd Edition, Cambridge University Press, (2012).

COURSE OUTCOMES

After completion of the GeneralChemistry - I course, the student will have the ability to:

- Understand the need, types and uses of chemical bonds
 - Get awareness on the need, types and uses of organic reactions
 - Know about the characteristics, types and applications of catalysis
 - Acquire knowledge onthe characteristics, types and applications of biomolecules
 - Gain knowledge on the types and effect of pollutions
-



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus - II year - IV Semester (Distance Mode)

பாடப்பெயர் : தமிழ் (TAMIL)
(Course Title)

பாடக் குறியீடு : BFTMS-41
(Course Code)

பாட கற்றல் அளவெண் : 4
(Course Credits)

பாட நோக்கங்கள்

1. தமிழிலுள்ள சங்க இலக்கியம், காப்பிய இலக்கியம், நீதி இலக்கியம் குறித்து அறிமுக நிலையில் மாணவர்களுக்கு அறிமுகம் செய்வதோடு, தமிழ் இலக்கிய வரலாறு குறித்தும் அறிமுகம் செய்தல்.

பாடத்திணைப் படிப்பதால் விளையும் பயன்கள்

1. தமிழிலுள்ள சங்க இலக்கியம், காப்பிய இலக்கியம், நீதி இலக்கியம் குறித்து அறிமுக நிலையில் மாணவர்களுக்கு அறிமுகம் செய்வதோடு, தமிழ் இலக்கிய வரலாறு குறித்தும் எடுத்துரைப்பார்கள்.
2. மரபுத் தொடர்கள், இணை மொழிகள் பற்றியும் எடுத்துரைப்பதோடு, ஓரங்க நாடகம், ஐக்கூ கவிதை படைக்கும் முனைப்பினையும் பெறுவார்கள்.

பிரிவு - 1 சீவகசிந்தாமாணி - குணமாலையார் இலம்பகம்

சீவகசிந்தாமணி - காப்பிய அமைப்பு - முன்கதைச்சுருக்கம் - இலம்பகத்தின் கதைச்சுருக்கம் - கண்ணப் பூசல் - குணமாலையும் சுரமஞ்சரியும் பொழிலாடல் - சுரமஞ்சரி துளுரை - கண்ணப்பொடியுடன் தோழியர் - மீன்குழம் மாமதிபோல் சீவகன் - தோழியார் வேண்டல் - சீவகன் தீர்ப்புரை - வாரம் பட்டுழித் தீயவும் நல்லவாம் - வண்டுகளின் தீர்ப்பு - இடியுண்ட நாசம்போல் சுரமஞ்சரி - குணமாலையின் இனிய பண்பு.

பிரிவு - 2 கம்பராமாயணம் - நகர்நீங்கு படலம்

கம்பராமாயணம் - முன்கதைச்சுருக்கம் - படலத்தின் கதைச் சுருக்கம் - மகளிர் அவலம் - விலங்குகளின் அவலம் - பிற மக்களின் அவலம் - மரவுரியில் இராமன் - மனத்துயரில் சீதை - வருவென் ஈண்டு வருந்தலை நீ - தீய வெஞ்சொல் செவிசுடத் தேபுவாள் - என்னை என்னை இருத்தி என்றாய் - நின் பிரிவினுஞ் சுடுமோ பெருங்காடு - சீதையும் மரவுரி தரித்தல் - எல்லையற்று

இடர் தருவாய் என்றான்.

பிரிவு - 3

சங்க காலம் (கி.மு. 300 - கி.பி. 100)

முச்சங்க வரலாறு - சங்கம் இருந்ததா? இல்லையா? ஒரு சங்கம் இருந்ததற்கான சான்றுகள் - எட்டுத்தொகை நூல்கள் - பத்துப்பாட்டு நூல்கள் - சங்க காலம் ஒரு பொற்காலம்

பிரிவு - 4

பதினெண் கீழ்க்கணக்குக் காலம் (கி.பி. 100 - கி.பி. 600)

களப்பிரர் காலம் - தமிழக வரலாற்றின் இருண்ட காலம் - அகத்திணை நூல்கள் - புறத்திணை நூல்களில் போர் பற்றியது - அறநூல்கள்

பிரிவு - 5

காப்பிய காலம் (கி.பி. 200 - கி.பி. 1100)

தமிழின் முதல் காப்பியம் - இரட்டைக் காப்பியங்கள் - ஐம்பெருங்காப்பியங்கள் - ஐஞ்சிறுங்காப்பியங்கள் - தமிழின் பிற காப்பியங்கள்.

பிரிவு - 6

தமிழ் இலக்கியத்தில் சமணர், பௌத்தர் செல்வாக்கு

தமிழகத்தில் சமணர் செல்வாக்கு - தமிழகத்தில் பௌத்தர் செல்வாக்கு

பிரிவு - 7

மரபுத் தொடர்கள், இணைமொழிகள்

எதிர்மறைக் குறிப்புத் தொடர் - இடக்கரடக்கல் - மங்கலவழக்குத் தொடர் - வசைமொழித் தொடர் - சுவைதரும் வெளிப்பாட்டுத் தொடர் - பிற மரபுத்தொடர்கள் - ஒருபொருள் இணைமொழிகள் - எதிர்நிலை இணைமொழிகள் - பிற இணைமொழிகள் - வட்டார இணைமொழிகள் - கிகர கீகார மொழிகள்.

பிரிவு - 8

சொற்பொழிவுத்திறன் பயிற்சி

இலக்கியச் சொற்பொழிவு - சமயச் சொற்பொழிவு - அரசியல் சொற்பொழிவு - பிற சொற்பொழிவுகள் - குறிப்புகள் சேகரித்தல் - கேளாரும் வேட்ப மொழியும் திறன் - நகைச்சுவைத் திறன் - ஈர்ப்புத் திறன் - அவிநயமும் உச்சரிப்பும்

பிரிவு - 9

ஓரங்க நாடகம் படைக்கும் முயற்சி

ஓரங்க நாடகம் எழுதும் படிநிலைகள் - நாடகக் கதையை முடிவுசெய்தல் - களம் பிரித்தலும் நிகழ்வுக் குறிப்பும் - உரையாடல் எழுதுதல் - நாடகப் பிரதியைச் செப்பனிடுதல் - நடிகர்கள் தேர்வு - ஒத்திகை முறைகள் - நாடக இயக்கம் - திட்டமிடுதலும் நிகழ்த்தலும் .

பிரிவு - 10

ஐக்கூக் கவிதை புனையும் பயிற்சி

ஈற்றடி இலக்கணம் - உள்ளடக்கப் பாடுபொருள் இலக்கணம் - வெளிப்பாட்டு உத்தி - இயற்கையைப் பாடும் ஐக்கூ - வாழ்வியல் ஐக்கூ - காதல் ஐக்கூ - சென்றியூ -எள்ளல் அல்லது நகைச்சுவை ஐக்கூ

பார்வை நூல்கள்:

1. மு. வரதராசன், தமிழ் இலக்கிய வரலாறு, சாகித்ய அக்காதெமி, புதுடெல்லி,
2. மது. ச. விமலானந்தன், தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை.
3. தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை.
4. பி.எஸ். ஆச்சார்யா, உயர்வுதரும் உரையாடல்கலை, நர்மதா பதிப்பகம், சென்னை.
5. மு. முத்துக்காளத்தி, பேசுவது எப்படி, கண்ணம்மாள் பதிப்பகம், பாரி நிலையம், சென்னை.
6. பரட்டை, நடிக்க நாடகம் எழுதுவது எப்படி? வைகறைப் பதிப்பகம், திண்டுக்கல். 1998
7. சே. இராமானுஜம், நாடகப் படைப்பாக்கம் அடித்தளங்கள், எட்டாம் உலகத் தமிழ் மாநாடுபதிப்புச் சூழல் நிதி வெளியீடு, தமிழ்ப்பல்கலைக்கழகம், தஞ்சாவூர், 1994.
8. சுஜாதா, ஹைக்கூ ஒரு அறிமுகம், பாரதி பதிப்பகம், 108 உஸ்மான் சாலை, தி. நகர், சென்னை, 1991.
9. மேஜர் கதிர் மகாதேவன், ஐக்கூ நூறு, ஒப்பிலக்கியத்துறை, மதுரை காமராசர் பல்கலைக்கழகம், மதுரை, 1994.
10. நெல்லை ச. முத்து, தமிழில் ஹைக்கூ, அன்னம் வெளியீடு, சிவன்கோயில் தெரு, சிவகங்கை, 1994.
திரு. பட்டாபி சீத்தாரமான், ஹைக்கூ வடிவக் கவிதைகள், காவ்யா, சென்னை.



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus - II year - IV Semester (Distance Mode)

COURSE TITLE : Foundation in English (Writing Skills)

COURSE CODE : BFEGS- 41

COURSE CREDIT : 4

COURSE OBJECTIVES

- Train the learners to write the academic essays
 - To make them learn different steps of writing
 - To develop the learners' creativity
 - To distinguish between fact and opinion, cause and effect, problem and solution, similarities and differences, general and specific ideas, and relevant and irrelevant information.
 - To convey information through written language
 - To involve in note-taking, gathering information, drafting, free-writing, revising, proofreading, and editing when engaged in writing.
-

COURSE OUTCOMES

On successful completion of the Course, the learners will be able to:

- write without mistakes
 - draft formal and informal letters
 - take notes for writing purpose
 - explain the tables/ pictures in words
 - edit the written matters
-

BLOCK-01 Basic Writing Skills

Learn the basic paragraph structure: main idea, supporting sentences, use of examples, conclusion- Use basic sentence structures to write a paragraph; use cohesive devices to connect sentences in a paragraph; use transitional devices for cohesion and for contrast paragraph internally and between paragraphs (The above structures and devices to be consciously used in all writing tasks)- Understand and

use text structures in paragraphs: sequencing, comparing and contrasting, relating cause and effect, problems and problem solving

BLOCK-02 Informal and Formal Communication

Write informal letters, applications, and official letters of request and denial- Write official e-mails, memos and notices

BLOCK-03 Note-Making and Summarising

Prepare notes from reading texts- Take notes from spoken texts-Summarize key ideas and information in organized points developed from the notes prepared

BLOCK-04 Study Skills (Information Transfer, Reference Skills)

Use charts, tables, other graphics and multimedia, as appropriate for the written texts; present summary to a group

Block- 05 Technical Editing

Technical Editing – The Big Picture- Working Collaboratively- Organization: The Architecture of Information- Visual Design and Font Selection- Editing Methods – Then and Now- The Power of Grammar, Punctuation and Spelling- Basic Copyediting- proofreading -Ethical and Legal Issues

References:

1. Graham King. *Collins Improve your writing skills*
2. Norman Coe and Robin Rycroft. *Writing Skills A Problem Solving Approach*. CUP.
3. Robyn Najar and Lesley Riley. *Developing Academic Writing Skills*.Macmillan Publications.
4. Scheraga, Mona. *Practical English Writing Skills: A Complete Guide to Writing in English*

Web Resources:

1. <https://nptel.ac.in/courses/109/107/109107172/>
2. <https://nptel.ac.in/courses/109/104/109104031/>
3. https://onlinecourses.swayam2.ac.in/cec20_ma04/preview



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus - II year - IV Semester (Distance Mode)

COURSE TITLE : ELECTRICITY AND ELECTROMAGNETISM
COURSE CODE : BPHYS 41
COURSE CREDIT : 5

COURSE OBJECTIVES

While studying the **ELECTRICITY AND ELECTROMAGNETISM**, the Learner shall be able to:

CO 1: Explain the concept of magnetic effect of electric current

CO 2: Discuss the thermal and chemical effect of electric current

CO 3: Classify electromagnetic induction and applications

CO 4: Interpret AC and DC Circuits

CO 5: Describe Maxwell's Equation and Propagation of Electromagnetic Waves

COURSE SYLLABUS

BLOCK I: MAGNETIC EFFECT OF ELECTRIC CURRENT

Magnetic flux and magnetic induction- Biot Savart law- magnetic induction at a point due to a straight conductor carrying current - magnetic induction at a point on the axis of a circular coil carrying current- Amperes circuital law-magnetic field inside a long solenoid -toroid- Lorentz force on a moving charge- direction of force-torque on a current loop in a uniform magnetic field. Moving coil Ballistic galvanometer-theory -experiment to find charge sensitivity and absolute capacity of a capacitor-De-sauty's bridge

BLOCK II: THERMAL AND CHEMICAL EFFECT OF ELECTRIC CURRENT

Thermoelectricity- Seebeck effect- laws of thermo e.m.f - measurement of thermo e.m.f using potentiometer-Peltier effect-demonstration- Thomson effect-demonstration - thermodynamics of thermo couple -thermo electric diagram -uses-applications-thermopile-Boy's radio micrometre -thermo-milli ammeter - Faradays

laws of electrolysis- electrical conductivity of an electrolyte-specific conductivity- Kohlrausch's bridge method of determining the specific conductivity of an electrolyte. Arrhenius theory of electrolytic dissociation- --mobility of ions- Secondary cells- Gibbs -Helmholtz equation for a reversible cell

BLOCK III: ELECTROMAGNETIC INDUCTION

Faraday's laws of electromagnetic induction-self induction -self inductance of a long solenoid - self inductance of toroidal solenoid- determination of L by Anderson's and Rayleigh's methods-Owen's bridge. Mutual induction-mutual inductance between two co-axial solenoids- experimental determination of mutual inductance --co-efficient of coupling- energy stored in a coil. Eddy currents-uses - Earth inductor-uses-search coil- induction coil and its uses

BLOCK IV: AC AND DC CIRCUITS

Growth and decay of current in LC,LR and CR circuits with d.c.voltages - determination of high resistance by leakage -growth and decay of charge in LCR circuit-conditions for the discharge to be oscillatory -frequency of oscillation.

Alternating Current- j operator method -use of j operator in the study of AC circuits-Resistance in an AC circuit-Inductance in an AC circuit. Capacitance in an AC circuit-AC through an inductance and resistance in series- capacitance and resistance in series - LCR series resonance circuit -sharpness of resonance-parallel resonance circuit -power in an AC circuit-power factor.

BLOCK V: MAXWELL'S EQUATION & ELECTROMAGNETIC WAVES

Introduction- Maxwell's equations- -Displacement current- Poynting vector- Electromagnetic waves in free space-Hertz experiment for production and detection of EM waves. Wave equations for Electric field and Magnetic field-monochromatic plane waves. EM waves in a matter-Reflection and Transmission at normal incidence and oblique incidence-Polarization by reflection.

Books for study:

1. Electricity and Magnetism, R. Murugesan, S Chand & Co, New Delhi,2008
2. Electricity and Magnetism, BrijLal & Subramanyam, Ratan Prakashan Mandir Publishers, Agra, 2005

3. Electricity & Magnetism, M.Narayanamurthy & N.Nagarathnam, NPC pub., Revised edition.

Books for Reference:

1. Electricity and Magnetism -D.N.Vasudeva (Twelfth revised edition)
2. Electricity and Magnetism - K.K.Tiwari ,S.Chand &Co.
3. Electricity and Magnetism -E.M.Pourcel,Berkley Physics Course, Vol.2 (Mc Graw-Hill)
4. Electricity and Magnetism - Tayal (Himalalaya Publishing Co.)
5. Electricity and Magnetism ,D.Halliday, R.Resnick and J.Walker, Fundamentals of Physics, Wiley India,Pvt Ltd,2011.
6. Introduction to Electrodynamics, David J. Griffith, PHI, New Delhi, 2012

Web Resources

<https://www.thoughtco.com/introduction-electricity-and-magnetism-4172372>

1. <http://web.mit.edu/sahughes/www/8.022/>
2. <http://orca.phys.uvic.ca/~tatum/elmag.html>
3. https://phys.libretexts.org/Bookshelves/Electricity_and_Magnetism
4. <https://www.electricityforum.com/electricity-and-magnetism>
5. <https://openpress.usask.ca/Physics155/>

COURSE OUTCOMES

After completion of the **ELECTRICITY AND ELECTROMAGNETISM**, the Learner will be able to:

- CLO 1: Determine the magnetic induction at a point on the axis of a circular coil carrying current using Biot Savart law
- CLO 2: Demonstrate Thermoelectricity and measure thermo e.m.f using potentiometer using the principle of Seebeck effect, Peltier effect and Thomson effect.
- CLO 3: Interpret Self and Mutual Induction and explain the applications of Eddy Current
- CLO 4: Apply and Analyze the Growth and decay of current in LC,LR and CR circuits With D.C.voltages
- CLO 5: Apply the concepts of electrodynamics to describe the behaviour of EM waves in different media



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus - II year - IV Semester (Distance Mode)

COURSE TITLE : BASIC ELECTRONICS
COURSE CODE : BPHYS 42
COURSE CREDIT : 5

COURSE OBJECTIVES

While studying the **BASIC ELECTRONICS**, the Learner shall be able to:

CO 1: Analyze basic simple circuits using network theorems and describe the fundamental principles of semiconductors

CO 2: Discuss biasing of transistor and the application of transistor as amplifiers

CO 3: Classify the types of oscillators and Multivibrator

CO 4: Explain Special Semiconductor Devices and their applications

CO 5: Illustrate the characteristics of an operational amplifier along with its applications

COURSE SYLLABUS

BLOCK I: Linear circuit analysis and semiconductor diodes

Constant voltage source - constant current source - Maximum power transfer theorem- **Thevenin's** theorem - procedure for finding Thevenin Equivalent circuit. PN junction theory - V-I characteristics of a PN junction diode - Half wave rectifier - Bridge rectifier - Efficiency. Filters - Shunt capacitor filter - pi filter - Zener diode - equivalent circuit - voltage regulator. LED - V-I characteristics - advantages - applications - photo diode - characteristics - applications.

BLOCK II: Transistor Amplifier

Transistor - Different modes of operations - CB mode & CE mode - Two port representation of a transistor - h parameter. AC equivalent circuit using h parameters - analysis of amplifiers using h parameters (CE only). RC coupled

amplifier - transformer coupled amplifier - Power amplifier -classification of amplifiers - Class A, Class B and Class C - Push pull amplifier - Emitter follower.

BLOCK III: Oscillators and Multivibrator

Feedback principle -effect negative feedback-and Barkhausen criterion - Phase shift and Wien Bridge oscillators using transistors -Expression for frequency. Multivibrators- Astable and Monostable multi vibrators. Bistable multi vibrators using transistors - Schmitt trigger.

BLOCK IV: Special Semiconductor Devices

Clipping and clamping circuits. - Differentiating circuit - Integrating circuit - Field effect Transistor FET-MOSFET- UJT. SCR -characteristics - FET as a VVR-UJT relaxation oscillator-SCR as a switch and rectifier

BLOCK V: Operational Amplifier

Operational Amplifier- characteristics-parameters-applications- Inverting amplifier - Non inverting amplifier - Voltage follower- Adder - Subtractor- Integrator - Differentiator- Solving simultaneous equations. Comparator -square wave generator -Wien bridge oscillator -Schmitt trigger

Books for Study:

1. Hand Book of Electronics by Gupta and Kumar - PragatiPrakashan - Meerut,2002.
2. Principles of Electronics by V.K. Mehta, Rohit Mehta S. Chand & Co.,2006.
3. Electronics by M. Arul Thalapathi, ComptekPublishers,2005.
4. Elements of Electronics by M.K.Bagde and Singh S.P., S. Chand & Co., NewDelhi,1990.
5. Applied Electronics by A. Subramanyam - National Publishing Co.,1997.
6. OP - AMPs and Linear Integrated Circuits by Ramakant A. Gayakwad, PrenticeHall of India(1994).

Books for Reference:

1. Electronic Devices by Mittal.G.K., G.K. Publishers Pvt. Ltd., 1993.
2. Basic Electronics by B.L. Theraja, S. Chand & Co., 2008.
3. Solid State Electronics by Ambrose and Vincent Devaraj, Meera Publication. 73

4. Applied Electronics by R.S. Sedha, S. Chand & Co.1990.

Web Resource

1. <https://nptelvideos.com/lecture.php?id=9125>
2. <https://nptelvideos.com/lecture.php?id=9116>
3. <https://nptelvideos.com/lecture.php?id=958>
4. <https://nptelvideos.com/lecture.php?id=987>
5. <https://nptelvideos.com/lecture.php?id=974>
6. <https://nptelvideos.com/lecture.php?id=975>
7. <https://nptelvideos.com/lecture.php?id=978>
8. <https://nptelvideos.com/lecture.php?id=9348>
9. <https://nptelvideos.com/lecture.php?id=9347>

COURSE LEARNING OUTCOMES

After completion of the **BASIC ELECTRONICS**, the Learner will be able to:

CLO 1: Apply and Solve complex circuits using network analysis(Thevenin's theorem) and explain the characteristics and applications of PN Junction

diodes

CLO 2: Demonstrate the basic concept behind the working process of transistor amplifier and classify types of power Amplifier.

CLO 3: Explain the Feedback principle and design the Phase shift and Wien Bridge oscillators using transistors

CLO 4: Illustrate the Characteristics of FET,MOSFET, UJT and SCR

CLO 5: Perform the mathematical operation like summing, difference and Solvingsimultaneous equations by constructing circuit using operational amplifier.



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus - II year - IV Semester (Distance Mode)

COURSE TITLE	:	GENERALCHEMISTRY - II
COURSE CODE	:	BCHESA 42
COURSE CREDIT	:	4

COURSE OBJECTIVES

While studying the General Chemistry - II course, the student shall be able to:

- Know about the types of mass units and terms involved in the volumetric analysis
- Understand the types and uses of purification techniques of organic molecules
- Study the definition, types and applications of polymerization and polymers
- Get awareness on the definition, types and applications of biomolecules
- Gain knowledge on the types of laboratory hygiene and safety rules

COURSE SYLLABUS

Block I: Mass units and Volumetric analysis

Unit-1- Mass units: Definition and examples to Molarity, Molality and Normality - Weight and volume composition percentage

Unit-2- Volumetric analysis: Introduction and principle - Titration - Equivalence point - End Point - Analysis of end point - Indicators - Standard solutions (primary and secondary).

Block II: Purifications of Organic Compounds

Unit-3- Types of purification - Distillation, Fractional distillation, Steam distillation, Distillation under reduced pressure - Sublimation - Crystallizations - Fractional Crystallization.

Unit-4- Basic principle and types of Chromatography - RF value - applications of Column, Thin layer and Paper Chromatography techniques.

Block III: Polymers

Unit-5- Definition and examples to polymerization and polymers - types and properties of polymers - Addition and Condensation polymerization.

Unit-6- Natural rubber - Vulcanization of rubber - Preparation and applications of Polythene, Polystyrene, Teflon and Buna-S-rubber.

Block IV: Biomolecules - II

Unit-7- Definition, examples and uses of Hormones, reproductive hormones, Anti-malarial, Antiseptics and Disinfectants - Definition and uses of Chloroquine, Pamaquine chloramine-T, Iodoform and Dettol.

Unit-8:- Definition and uses of Antibiotics: Definition and uses of Penicillin, Chloromycetin, Streptomycin and Tetracycline - Definitions and examples for analgesics, anaesthetics, antipyretics and antiinflammatory.

Block V: Laboratory hygiene and Safety rules

Unit-9- Common safety methods - Storage and handling of Carcinogenic chemicals, Poisonous chemicals, easily vaporizable chemicals and Inflammable Chemicals.

Unit-10- Waste disposal - Fume disposal - General precautions for avoiding lab accidents - First aid techniques.

Text Books:

1. Environmental Chemistry and Green Chemistry by Asim K. Das.
2. Introduction to Chromatography by V.K. Srivastava, K.K. Srivastava. Edition II.
3. Organic Chemistry by AnupaSaha and AnupPathak, Volume I & II.
4. A text book of Organic Chemistry by ArunBhal, B.S. Bhal, and S. Chand.
5. Textbook of Pharmaceutical Chemistry and Medicinal Chemistry R. Mukhopadhyah, S. Dattaand R.K. Das.
6. A New Concise Inorganic Chemistry by J.D. Lee.
7. Text book of organic chemistry, P.L. Soni.
8. Organic chemistry of Natural Products by GurdeepWat, Volume I.
9. A Text book of Medical Biochemistry by S. Ramakrishnan, K.G. Prasanan and R.

Rajan.

10. Fundamentals of Biochemistry by J.L. Jain.

11. A Text of Medical biochemistry by AmbikaShanmugam.

12. Principles of Physical Chemistry by Puri, Sharma and Pathania.

Reference Books:

1. A text book of Organic Chemistry by ArunBhal, B. S. Bhal, and S.Chand.
2. Stereochemistry, Conformation and Mechanism by P.S. Kalsi, New Academic Science, (2020).
3. Organic Chemistry by I. L.Finar, and ELBS Longman, Volume I, 5th edition.
4. Organic Chemistry by AnupaSaha and Anup Pathak, Volume I & II, Books & Allied Ltd (2013).
5. Advanced Organic Chemistry (Organic Synthesis, Heterocycles& Biomolecules) by N. Tewari, Books & Allied Ltd (2013).
6. Reactions, Rearrangements and Reagents by S.N. Sanyal, BharatiBhawan Publishers & Distributors; 4th edition (2019).

COURSE OUTCOMES

After completion of the GeneralChemistry - II course, the student will have the ability to:

- Gain knowledge on the types of mass units and terms involved in the volumetric analysis
 - Acquire knowledge on the types and uses of purification techniques of organic molecules
 - Know the definition, types and applications of polymerization and polymers
 - Know the definition, types and applications of biomolecules
 - Understand the characteristics and types of laboratory hygiene and safety rules
-



B.Sc., Physics - Syllabus -II year -IV Semester (Distance Mode)

COURSE TITLE : PRACTICAL -II
COURSE CODE : BPHYS -P2
COURSE CREDIT : 4

ANY TWELVE EXPERIMENTS ONLY

COURSE OBJECTIVES

While studying the **PRACTICAL - II**, the Learner shall be able to:

- CO 1: Determine the value of acceleration due to gravity at a given place.
- CO 2: Measure the elastic property such as Young's modulus of a material.
- CO 3: Determine the refractive index of a solid prism using spectrometer.
- CO 4: Determine the High Resistance using Balastic Galvanometer.
- CO 5: Demonstrate the Characteristics of Zener Diode

LIST OF EXPERIMENTS

1. Rigidity Modulus - Torsional Pendulum - With & Without symmetrical masses
2. Quincke's method - Surface Tension and Angle of Contact of Mercury
3. Specific heat capacity - Newton's law of cooling - Spherical calorimeter
4. Spectrometer - Hollow prism - Refractive index of the Prism
5. Determination of MH and BH
6. Zener diode - Characteristics
7. Spectrometer - ($i - i'$) curve
8. Newton's rings - Refractive index of a lens
9. Reduction factors of a Tangent Galvanometer - BG
10. Comparison of Mutual Inductance - BG
11. Spectrometer - Grating - Minimum deviation & Normal Incidence

12. Young's Modulus – Koenig's Method – Non Uniform bending
13. Young's Modulus – Koenig's Method – Uniform bending
14. Spectrometer – Cauchy's constant
15. Spectrometer – Dispersive Power
16. Spectrometer – Narrow Angled Prism
17. Carey Foster's Bridge – Temperature Coefficient
18. Potentiometer – EMF of a thermocouple
19. B.G - Absolute Capacity
20. B.G – Determination of High Resistance

Web Resources

1. <https://vlab.amrita.edu/index.php?sub=1&brch=280&sim=210&cnt=2>
2. <https://vlab.amrita.edu/?sub=1&brch=280&sim=1509&cnt=1>
3. <https://rb.gy/m7bgb1>
4. <https://vlab.amrita.edu/?sub=1&brch=192&sim=847&cnt=1>
5. <http://vlabs.iitb.ac.in/vlabs-dev/labs/physics-basics/labs/carey-foster-bridge-iitk/simulation.html>
6. <https://academo.org/demos/logic-gate-simulator/>
7. http://ov-au.vlabs.ac.in/optics/Spectrometer_Refractive_Index/
8. <http://amv-au.vlabs.ac.in/advancedmechanics/CompoundPendulum/experiment.html>

COURSE LEARNING OUTCOMES

After completion of the **PRACTICAL - II**, the Learner will be able to:

- CLO 1: Define the aim of the experiment and explain the various parameters in the formula that is used to estimate the physical property of a material. Identify the equipment and get the accessories.
- CLO 2: Arrange and assemble the gadgets and carry out the experiment.
- CLO 3: List the observations and repeat the experiment to find the average and hence determine the physical quantity by making use of the required formula.
- CLO 4: Interpret and report the result and classify the materials based on the Measurement(or) verify a given law. Sketch the variations wherever required.
- CLO 5: Analyze the results of the experiment with an aim to construct or design an equipment or a device for use in project work/research work.



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus - III year - V Semester (Distance Mode)

COURSE TITLE : ATOMIC Physics

COURSE CODE : BPHYS 51

COURSE CREDIT : 5

COURSE OBJECTIVES

While studying the **ATOMIC PHYSICS**, the Learner shall be able to:

CO 1: Discuss the band theory of solids and their classification

CO 2: Explain the Positive rays and its applications

CO 3: Demonstrate the fundamental principles governing the structure of the atom and atom models.

CO 4: Describe the fine structure of spectral lines and the angular momentum coupling

Schemes

CO 5: Provide an introductory account about the impact of X-rays and Photoelectric Effect

COURSE SYLLABUS

BLOCK I: BAND THEORY OF SOLIDS

The free electron theory of metals - expressions for electrical conductivity. Thermal conductivity - Wiedman-Franz's law. Hall effect-magneto resistance-determination of electronic charge - Millikan's oil drop method - electron microscope. Band theory of solids - classification of solids on the basis of band theory.

BLOCK II: POSITIVE RAYS:

Discovery-properties- analysis - Thomson's parabola method. Aston's mass spectrograph- Bainbridge's mass spectrograph. Dempster's mass spectrograph- Dunnington's method of determining e/m .

BLOCK III: ATOMIC STRUCTURE

Early atomic spectra-Thomson model-Alpha particle scattering-Rutherford's nuclear

model-drawbacks. Bohr atom model -Bohr's interpretation of the Hydrogen spectrum-correction for nuclear motion-evidences in favour of Bohr's theory- Ritz combination principle-correspondence principle-Sommerfield's relativistic atom model-drawbacks. The vector atom model - Quantum numbers associated with the vector atom model -The Pauli's exclusion principle - periodic classification of elements

BLOCK IV:FINE STRUCTURE OF SPECTRAL LINES

Coupling schemes-L-S Coupling-j-j Coupling-Hund rules- magnetic dipole moment due to orbital motion of the electron- due to spin of the electron - Stern and Gerlach experiment-spin-orbit coupling. Optical spectra-spectral terms-spectral notation-selection rules- intensity rules- interval rule- fine structure of sodium D line-hyperfine structure- Normal Zeeman effect- theory and experiment- quantum mechanical explanation - Larmor's theorem -Anomalous Zeeman effect- Paschen - Bach effect-Stark effect.

BLOCK V:X-Rays andPhoto Electric Effect

Production of X-rays - properties-absorption of X-rays - X-ray absorption edges.Bragg's law - Bragg's X-ray spectrometer -the powder crystal method -Laue's method. Rotating crystal method -X-ray spectra- continuous spectra- characteristic spectra-Moseley's law -importance-width of spectral lines-Doppler broadening-collision broadening. X-ray Detectors-scintillation detector-semiconductor detectors - Compton effect- theory and experimental verification.

Photo Electric Effect: Einstein's photoelectric equation-photoelectric cells-photo emissive cells-photovoltaic cells-photoconductive cells-applications of photoelectric cells

Books for Study:

1. Modern Physics by R. Murugesan, KiruthigaSivaprasath, S. Chand & Co., New Delhi, 2008.
2. Modern Physics by D.L.Sehgal, K.L.Chopra and N.K.Sehgal. Sultan Chand & Sons Publication, 7th Edition, New Delhi,1991.
3. Atomic Physics by J.B. Rajam, S. Chand & Co., 20thEdition, New Delhi,2004.

4. Atomic and Nuclear Physics by N. Subrahmanyam and BrijLal, S. Chand & Co. 5th Edition, New Delhi,2000.

Book for Reference:

1. Modern Physics by J.H. Hamilton and Yang, McGraw-Hill Publication, 1996.
2. Concepts of Modern Physics by A. Beiser, Tata McGraw-Hill, New Delhi 1997.
3. Fundamentals of Physics by D.Halliday, R.Resnick and J. Walker, Wiley, 6thEdition, New York,2001.
4. Modern Physics by Kenneth S.Krane, John Willey & sons, Canada, 1998.

Web resource

1. [Atomic and Nuclear Physics – a quick review\(utoronto.ca\)](#)
2. [phy008_lecturenotes_v1\(sheffield.ac.uk\)](#)
3. [NuclearPhysics.dvi\(bhattadevuniversity.ac.in\)](#)
4. [Basic Nuclear and Atomic Physics\(tamu.edu\)](#)
5. [Atomic Structure - | Positive Rays | - YouTube](#)
6. [Band Theory of Solids - Energy Bands in Solids, Explanation with Illustrations \(byjus.com\)](#)
7. [13 Band Theory of Solids part 1\) - YouTube](#)
8. [Atomic Structure - YouTube](#)
9. [FINE STRUCTURE OF HYDROGEN SPECTRUM || PART - 1 || HYDROGEN FINE SPECTRA || WITH EXAM NOTES || - YouTube](#)
10. [Describing the photoelectric effect and X-rays \(20 of 41\) - YouTube](#)

COURSE LEARNING OUTCOMES

After completion of the **ATOMIC PHYSICS**, the Learner will be able to:

CLO 1: Determine the electrical and Thermal conductivity of metals on the basis of free electron theory

CLO 2: Design and determine the mass of isotopes using Bainbridge's mass Spectrograph

CLO 3: Interpret the Thomson model, Bohr atom model and Vector atom model.

CLO 4: Distinguish between Normal and Anomalous Zeeman effect and Explain the L-S Coupling and j-j Coupling

CLO 5: Compare powder crystal method, Laue's method and Rotating crystal method of X ray Diffraction.



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus - III year - V Semester (Distance Mode)

COURSE TITLE : RELATIVITY AND QUANTUM MECHANICS
COURSE CODE : BPHYS 52
COURSE CREDIT : 5

COURSE OBJECTIVES

While studying the **RELATIVITY AND QUANTUM MECHANICS**, the Learner shall be able to:

CO 1: Discuss the fundamental of Relativity and frame of reference

CO 2: Describe the Wave Nature of Matter

CO 3: familiarize the students to the new mathematical tools such as operators and linear vector space required for venturing into the realm of quantum mechanics and to introduce Schrodinger wave equation.

CO 4: Explain the Angular Momentum in Quantum Mechanics

CO 5: Demonstrate the use of Schrodinger wave equation through some simple one-dimensional problems and their solutions.

COURSE SYLLABUS

BLOCK-I Relativity

Frames of reference - Galilean transformation - Michelson - Morley experiment - Postulates of special theory of relativity - Lorentz transformation - length Contraction - time dilation. Relativity of simultaneity - addition of velocities - variation of mass with velocity. Mass energy relation - Elementary ideas of general relativity.

BLOCK II: Wave Nature of Matter

Phase and group velocity - wave packet - expression of De Broglie's wave length.

Davisson and Germer's experiment - G.P.Thomson's experiment - Heisenberg's uncertainty principle and its consequences.

BLOCK III: Schrodinger Equation

Inadequacy of classical mechanics - Basic postulates of quantum mechanics - Schrodinger equation. Properties of wave function - Probability interpretation of wavefunction - linear operators - self adjoint operators - expectation value - eigenvalues and eigenfunctions - commutativity and compatibility.

BLOCK IV: Angular Momentum in Quantum Mechanics

Orbital angular momentum operators and their commutation relations - Separation of three dimensional Schrodinger equation into radial and angular parts. Elementary ideas of spin angular momentum of an electron - Pauli matrices.

BLOCK V: Solutions of Schrodinger Equation

Free particle solution - Particle in a box - Potential well of finite depth (one dimension) - linear harmonic oscillator - rigid rotator and hydrogen atom.

Books for Study:

1. A Text book of Quantum mechanics by P.M.Mathews and S.Venkatesan, TataMcGraw - Hill, New Delhi,2005.
2. Quantum Mechanics by V.K.Thankappan, New Age International (P) Ltd.Publishers, New Delhi,2003.
3. Quantum mechanics by K.K.Chopra and G.C. Agrawal, Krishna PrakasamMedia(P) Ltd., Meerut First Edition,1998.
4. Modern Physics by R. Murugesan and KiruthigaSivaprasath, S. Chand &Co.,2008.

Books for Reference:

1. Mechanics and Relativity by Brijlal Subramanyam, S.Chand& Co., New Delhi, 1990.
2. Concepts of modern physics by A.Beiser. Tata McGraw - Hill, 5thedition, NewDelhi,1997.
3. Introduction to quantum mechanics by Pauling and Wilson, McGraw - Hill.
4. Quantum mechanics by A.Ghatak and Loganathan, Macmillan India Pvt. Ltd.

Web Resource

1. https://onlinecourses.nptel.ac.in/noc20_cy27/preview
2. <https://nptel.ac.in/courses/115/101/115101107/>
3. <https://nptel.ac.in/courses/115/102/115102023/>
4. <https://www.azoquantum.com/video-details.aspx?VidID=9>
5. <https://nptel.ac.in/courses/115/106/115106066/>
6. <http://www.iiserpune.ac.in/~sdube/phy202/threeD.pdf>

COURSE LEARNING OUTCOMES

After completion of the **RELATIVITY AND QUANTUM MECHANICS**, the Learner will be able to:

CLO 1: Interpret Lorentz transformation, length Contraction and time dilation.

CLO 2: Explore the context of development of quantum mechanics and the dual nature of physical world and importance of Schrodinger wave equation to solve problems using uncertainty principle and operator algebra.

CLO 3: Discuss the Basic postulates of quantum mechanics and Properties of wave function

CLO 4: Modify orbital angular momentum formalism to suit spin angular momentum observations.

CLO 5: Setup and solve Schrodinger wave equation for one dimensional problems and identify the quantum features such as discreteness of the observables of the systems.



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus - III year - V Semester (Distance Mode)

COURSE TITLE : DIGITAL ELECTRONICS
COURSE CODE : BPHYS 53
COURSE CREDIT : 5

COURSE OBJECTIVES

While studying the **DIGITAL ELECTRONICS**, the Learner shall be able to:

CO 1: Acquire knowledge on number system and the fundamental concepts of logic gates and K map

CO 2: Develop skill to build and troubleshoot combinational digital circuits and Sequential Logic

CO 3: Interpret Modulation and Demodulation

CO 4: Discuss the Digital and Satellite Communication

CO 5: Explain the fundamentals of Fibre Optic Communication

COURSE SYLLABUS

BLOCK I: Digital Fundamentals

Number Systems and Conversions -BCD Code - Gray code - 1's and 2's complements. Basic logic gates - NAND, NOR and EX-OR gates - NAND and NOR as Universal Building blocks. Laws and theorems of Boolean algebra -- NAND-NAND circuits - Karnaugh's map- SOP and POS- applications

BLOCK II : Sequential Logic

Flip-flop -RS, Clocked RS, D flip-flop - J-K and J-K Master-Slave Flip-flop. Shift registers and Counters- Multiplexers and Demultiplexers. Decoders and Encoders - Memory Circuits -D/A and A/D converters

BLOCK III: Modulation and Demodulation

Amplitude modulation - Frequency modulation, Phase Modulation and Pulse Width Modulation.

Detectors of AM, FM, Detectors of PM and PWM, PLL - Noise in Communication Systems

BLOCK IV: Digital and Satellite Communication

ASK, FSK, PSK Modulation and Demodulation, Advantages and disadvantages of digital communication. Communication Satellite Systems - Telemetry - Tracking and Command System. Satellite Links - Commonly Used frequency in Satellite Communication - Multiple access - Error Detection.

BLOCK V : Fibre Optic Communication

Basic Fibre Optic System - Advantages of Fibre Optic System.-Propagation of light through fibre - Numerical aperture - Acceptance angle - Losses and distortion in optical fibres.Basic fibre Optical communication and links - Special applications

Books for Study:

1. Digital Principles and Application by Malvino Leach, Tata McGraw Hill, 4thEdition(1992).
2. Digital Fundamentals by Thomas L. Floyd, Universal Book Stall, New Delhi(1998).
3. Introduction to Integrated Electronics by V.Vijayendran, S. Viswanathan (Printersand Publishers) Pvt. Ltd., Chennai(2005).

Books for Reference:

1. Digital Electronics by Practice Using Integrated Circuits - R.P.Jain - Tata McGrawHill(1996).
2. Linear Integrated Circuits by D. Roy Choudhury and Shail Jain - New AgeInternational (P) Ltd.(2003).
3. Electronics - Analog and Digital by I.J. Nagrath - Prentice - Hall of India, NewDelhi(1999).
4. Integrated Electronics by J.Millman and C.Halkias, Tata McGraw Hill, New Delhi(2001)

Web Resource

1. <https://circuitglobe.com/rs-flip-flop.html>
2. <http://hyperPhysics.phy-astr.gsu.edu/hbase/Electronic/jkflipflop.html>
3. <https://circuitglobe.com/half-adder-and-full-adder-circuit.html>
4. <https://programmerbay.com/construct-4-to-1-multiplexer-using-logic-gates/>
5. <https://www.electronicshub.org/demultiplexerdemux/>
6. <https://www.elprocus.com/designing-of-2-to-4-line-decoder/>
7. <https://www.electricaltechnology.org/2018/05/bcd-to-7-segment-display-decoder.html>

COURSE LEARNING OUTCOMES

After completion of the **DIGITAL ELECTRONICS**, the Learner will be able to:

CLO 1: Discuss the structure of various number system and basic logic gates and design and solve the Boolean Algebra simplification and Karnaugh Maps.

CLO 2: Analyze the sequential circuits and to design shift registers and counters,

CLO 3: Classify AM, FM and PM modulation and demodulation techniques

CLO 4: Explain the working principle of satellite communication system

CLO 5: Describe the basic concepts of fiber optics communications and interpret

Numerical aperture, Acceptance angle, Losses and distortion in optical fibres



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus -III year -V Semester (Distance Mode)

COURSE TITLE : MATHEMATICAL METHODS
COURSE CODE : BPHYS 54
COURSE CREDIT : 5

COURSE OBJECTIVES

While studying the **MATHEMATICAL METHODS**, the Learner shall be able to:

CO 1: Introduce the Basics of Errors and Root of Equations

CO 2: Discuss the Matrix and Linear Equations

CO 3: Describe the basics of Interpolation and Approximation

CO 4: Examine the Numerical Differentiation and Integration

CO 5: Solve the Differential Equations and their physical applications

COURSE SYLLABUS

BLOCK I: Errors and Root of Equations

What is Numerical analysis-numbers and their accuracy. Errors-measurement of errors-round off error-truncation error-absolute error-relative error-percentage error-inherent error-accumulated error-general error formulae -convergence -Roots of equations-Iteration method-Maclaurin's series method.Newton-Raphson method-Von-Moises formula-Bisection method.

BLOCK II: Matrix and Linear Equations

Introduction- pivotal condensation method- system of linear equations. Gauss Elimination method- Gauss Seidal Iteration method. Gauss Jordan elimination method- Matrix Inversion method .

BLOCK III: Interpolation and Approximation

Linear Interpolation - Quadratic Interpolation. -Lagrange's Interpolation.
Richardson's Extrapolation - Aitken's iterated Interpolation

BLOCK IV: Numerical Differentiation and Integration

Numerical differentiation-approximation of derivatives using interpolation polynomials- Taylor series method. Numerical Integration - trapezoidal rule- simpson's 1/3 and 3/8 rules.

BLOCK V: Differential Equations

Introduction-Euler's method (Adams Bashforth first order method)- Backward Euler method- Taylor's series method. Runge-kutta method -Predictor corrector methods

Books for study and Reference:

1. Introductory methods of numerical analysis - S.S. Sastry, Prentice Hall of India, New Delhi ,2000.
2. Numerical methods - A. Singaravelu, Meenakshi Agency, Chennai,2001.
3. Numerical method in Science and Engineering - M.K. Venkataraman, PHI -New Delhi ,1997.
4. Mechanics and Mathematical methods, R. Murugesan, S. Chand & Co, NewDelhi ,1999.
5. Numerical methods by P. Kandasamy, K. Thilagavathy and K. Gunavathy, S. Chand & Co. 2002.

Web Resource

1. <https://www.youtube.com/watch?v=oY1F9QGLdTY>
2. <https://www.youtube.com/watch?v=GLSdCEwP2LI>
3. <https://www.youtube.com/watch?v=LjfACk-ugas>
4. <https://www.youtube.com/watch?v=q87L9R9v274>
5. <https://www.youtube.com/watch?v=o9MUMIWA5IE>

COURSE LEARNING OUTCOMES

After completion of the **MATHEMATICAL METHODS**, the Learner will be able to:

CLO 1: Identifying suitable mathematical tool for solving problems using numerical methods and Error analysis

CLO 2: Illustrate the Gauss Elimination method and Gauss Seidal Iteration method.

CLO 3: Apply and analyze Lagrange's Interpolation and Richardson's Extrapolation

CLO 4: Perform numerical integration using Trapezoidal and Simpson's method.

CLO 5: Solve algebraic or transcendental equations, numerical solutions of differential equations using Euler, Modified Euler and Runge Kutta methods



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus -III year -V Semester (Distance Mode)

COURSE TITLE : ENERGY PHYSICS
COURSE CODE : BPHYSE -51A
COURSE CREDIT : 4

COURSE OBJECTIVES

While studying the **ENERGY PHYSICS**, the Learner shall be able to:

CO 1: Discuss the Introduction to Energy Sources and their merits and demerits.

CO 2: Describe Solar Thermal Energy and their application

CO 3: Introduce the Photovoltaic Systems and its types

CO 4: Explain the basics of Biomass Energy and their classification

CO 5: Interpret the Wind Energy and Other Energy Sources

COURSE SYLLABUS

BLOCK I: Introduction to Energy Sources

World's reserve of Commercial energy sources and their availability- India's production and reserves. Conventional and non-conventional sources of energy, comparison - Coal- Oil and natural gas. Conventional and non-conventional energy applications - merits and demerits.

BLOCK II: Solar Thermal Energy

Solar constant -Solar spectrum-Solar radiations outside earth's atmosphere -at the earth surface- on tilted surfaces - Solar Radiation geometry-Basic Principles of Liquid flat plate collector -Materials for flat plate collector - Construction and working- Solar distillation-Solar disinfection - Solar drying. Construction and working of Solar cooker(box type)-Solar water heating systems - Swimming pool heating.

BLOCK III: Photovoltaic Systems

Introduction-Photovoltaic principle-Basic Silicon Solar cell- Power output and conversion efficiency. Limitation to photovoltaic efficiency-Basic photovoltaic system for power generation-Advantages and disadvantages- Types of solar cells- Application of solar photovoltaic systems - PV Powered fan – PV powered area - lighting system – A Hybrid System.

BLOCK IV: Biomass Energy

Introduction-Biomass classification- Biomass conversion technologies. Bio-gas generation-Factors affecting bio-digestion -Working of biogas plant- floating and fixed dome type plant -advantages and disadvantage of Bio-gas from plant wastes. - Methods for obtaining energy from biomass- Thermal gasification of biomass- Working of downdraft gasifier- Advantages and disadvantages of biological conversion of solar energy.

BLOCK V: Wind Energy and Other Energy Sources

Wind Energy Conversion-Classification and description of wind machines, wind energy collectors-Energy storage. Energy from Oceans and Chemical energy resources-Ocean thermal energy conversion-tidal power, advantages and limitations of tidal power generation- Energy and power from waves- wave energy conversion devices- Fuel cells- and application of fuel cells- batteries- advantages of battery for bulk energy storage- Hydrogen as alternative fuel for motor vehicles.

Books for study:

1. Renewable energy sources and emerging Technologies, Kothari D.P., K.C. Singal and Rakesh Ranjan, Prentice Hall of India, 2008.
2. Solar Energy-principles of thermal collection and storage- S.P.SUKHAME-tata- McGraw-Hill publishing company ltd.

Books for References:

1. Solar Photovoltaics Fundamentals, Technologies and Applications, Chetan Singh Solanki, 2nd Edition, PHI Learning Private Limited, 2011.

2. Non conventional Energy sources, Rai G. D, 4th Edition, Khanna Publishers, 2010.
3. Solar Energy: The State of the Art, Jeffrey M. Gordon, Earthscan, 2013.
4. Solar Energy Engineering: Processes and Systems Kalogirou S.A., , 2nd Edition, Academic Press, 2013.
5. Handbook of Renewable Energy Technology, Zobia A.F. and Ramesh Bansal, World Scientific, 2011.

Web Resources

1. [Sources of Energy – Vikaspedia](#)
2. [Introduction to Energy Sources - YouTube](#)
3. [Solar thermal energy - Appropedia](#)
4. [Solar Thermal Energy - YouTube](#)
5. [Lecture - 15 Solar Thermal Energy Conversion - YouTube](#)
6. [Fundamentals of Solar Photovoltaic Systems - YouTube](#)
7. [Solar Photovoltaic \(PV\) Systems, Scope, NEC 2020 - \[690.1\], \(39min:21sec\) - YouTube](#)
8. [Biomass crops are energy efficient and climate friendly | ERC \(europa.eu\)](#)
9. [Biomass Energy Basics | NREL](#)
10. [Wind Energy Basics | NREL](#)
11. [Sources of Energy – Vikaspedia](#)
12. [Wind energy facts, advantages, and disadvantages | Caltech Science Exchange](#)
13. [Fuel Cell - Definition, Working, Types, and Applications of fuel cell. \(byjus.com\)](#)
14. [Energy 101: Fuel Cells - YouTube](#)

COURSE LEARNING OUTCOMES

After completion of the **ENERGY PHYSICS**, the Learner will be able to:

CLO 1: Distinguish between the Conventional and non-conventional sources of Energy and their applications

CLO 2: Demonstrate the Construction and working of cooker(box type) and Solar water heating systems

CLO 3: Design and develop photovoltaic system for power generation and discuss

their Advantage and disadvantage.

CLO 4: Discuss Biomass conversion technologies and develop biogas plant from waste

CLO 5: Describe Wind Energy Conversion, Oceans and Chemical energy resources and design develop Fuel cells for energy storage



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus -III year -V Semester (Distance Mode)

COURSE TITLE : PROBLEMS SOLVING SKILLS IN PHYSICS
COURSE CODE : BPHYSE-51B
COURSE CREDIT : 4

COURSE OBJECTIVES

While studying the **PROBLEMS SOLVING SKILLS IN PHYSICS**, the Learner shall be able to:

CO 1: Solve Newtonian mechanics problems

CO 2: Apply thermodynamical concepts into real world problems

CO 3: Introduce the basic properties of charges and enable the students to apply in physical situations

CO 4: Describe the quantum mechanical principles and solve quantum mechanical problems.

CO 5: Demonstrate to plot any functions and calculate the error involved in a physical

Measurement

COURSE SYLLABUS

BLOCK I: Problems in Mechanics

Newton laws of motion for various systems (1, 2 and 3 dimension), Conservation laws and collisions, Rotational mechanics, central force, Harmonic oscillator, special relativity

BLOCK II: Problems in Thermal Physics

Kinetic theory- MB distribution-Laws of thermodynamics-Ideal Gas law-Variou Thermodynamic process- Entropy calculation for various process-Heat engine-TS and PV diagram-Free energies various relations

BLOCK III: Problems in Electricity & Magnetism

Electrostatics- calculation of Electrostatic quantities for various configurations- Conductors, Magneto statics- Calculation of Magnetic quantities for various configuration, Electromagnetic induction, Poynting vector, Electromagnetic waves.

BLOCK IV: Problems in Quantum mechanics

Origin of Quantum mechanics- Fundamental Principles of Quantum mechanics- potential wells and harmonic oscillator- Hydrogen atom.

BLOCK V: Problems in General Physics & Mathematics

Plotting the graphs for various elementary and composite functions- Elasticity- Viscosity and surface tension- fluids- Buoyancy- pressure- Bernoulli's theorem- applications- waves and oscillations, Errors and propagation of errors.

Text book for reference:

1. Mechanics (in SI units) by Charles Kittel, Walter D Knight etc. (Berkeley Physics course-volume 1), Tata McGraw Hill publication, second edition.
2. Thermal physics by S.C.Garg, R.M. Bansal & C.K. Ghosh. (Tata McGraw Hill Publications), 1st edition.
3. Electricity & magnetism (in SI units) by E.M. Purcell, Tata McGraw Hill Publication, 2nd Edition.
4. Quantum mechanics by N. Zettili, Wiley Publishers, second edition.
5. Introduction to quantum mechanics by David J. Griffiths, Pearson Publications, second edition.
6. Fundamentals of Physics by Halliday & Resnick, Wiley Publications, 8th Edition.
7. Advanced level physics by Nelson and Parker, CBS publishers, 7th edition
8. Play with graphs by Amith Agarwal, Arihant Publications.
9. Properties of matter by D.S. Mathur, S. Chand Publications, 11th Edition.

Web resource

1. <https://rb.gy/1qlsgf>
2. <https://www.youtube.com/watch?v=KOKnWaLiL8w&list=PLFE3074A4CB751B2B>
3. [SOLVED PROBLEMS ON METHOD OF RESOLUTION AND COMPOSITION OF FORCES \(PART-1\) | ENGINEERING MECHANICS - YouTube](#)
4. [Thermal Physics - Problems - YouTube](#)
5. [Electricity & Magnetism | Important Problems | JAM 2021 | Physics | Mohd Mubashir | Unacademy Live - YouTube](#)
6. [5 STEPS TO SOLVING PROBLEMS IN QUANTUM MECHANICS - THE PARTICLE IN A BOX - YouTube](#)
7. [problems on quantum mechanics from csir-net exam - YouTube](#)
8. [Physics Help: Problem Solving in Physics - YouTube](#)

COURSE LEARNING OUTCOMES

After completion of the **PROBLEMS SOLVING SKILLS IN PHYSICS**, the Learner will be able to:

CLO 1: Recollect and extend various concepts in mechanics, thermodynamics, quantum mechanics, electricity & magnetism

CLO 2: Apply and articulate the concepts in various types of competitive exam problems.

CLO 3: Solve and illustrate the solutions for these problems

CLO 4: Evaluate the methods of obtaining solutions for various concept

CLO 5: Construct similar problems and develop method of solutions for these problems



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus -III year -VI Semester (Distance Mode)

COURSE TITLE : SOLID STATE PHYSICS
COURSE CODE : BPHYS -61
COURSE CREDIT : 5

COURSE OBJECTIVES

While studying the **SOLID-STATE PHYSICS**, the Learner shall be able to:

CO 1: Describe the Bonding in Solids and their types

CO 2: Introduce the concept of crystal structure and determination of the same through X-ray diffraction

CO 3: Discuss the variety of magnetic materials with reference to their response to external magnetic fields and temperature

CO 4: Develop first principle calculations on the band theory of solids and apply it to distinguish between different types of materials and study in detail the dielectric behavior.

CO 5: Introduce the existing phenomena of superconductivity, the associated phenomena, their recent developments and their applications.

COURSE SYLLABUS

BLOCK I: Bonding in Solids

Types of bonds in crystals - Ionic, covalent, Metallic, Vander waal's and Hydrogen Bonding - Bond energy of sodium chloride molecule - variation of inter atomic force with inter atomic spacing - Cohesive energy - cohesive energy of ionic solids - application to sodium chloride crystal - evaluation of Madelung constant for sodium chloride.

BLOCK II: Crystal Structure and Crystal Diffraction

Crystal Lattice - Primitive and UNIT Cell - seven classes of crystal - Bravais Lattice - Miller Indices - Structure of crystals - Simple cubic, Face centered cubic, Body centered

cubic and Hexagonal close packed structure -Sodium Chloride, Zinc Blende and Diamond Structures. Crystal Diffraction - Bragg's law-Experimental methods-Laue method, powder method - Rotating crystal method-Reciprocal lattice- Intensity and structure factor.

BLOCK III: Magnetic Properties

Spontaneous Magnetization - Weiss Theory - Temperature dependence of Magnetization -

Classical Theory of Diamagnetism - Weiss theory of Para magnetism. Ferromagnetic domains - Bloch wall - Basic ideas of anti-ferromagnetism. Ferrimagnetisms - Ferrites in computer Memories.

BLOCK IV: Dielectric Properties

Band theory of solids -classification of insulators, Semiconductors, conductors - intrinsic and extrinsic semiconductor.Carrier concentration for electron - Barrier Potential Calculation - Rectifier Equation. Dielectrics - Polarization - frequency and temperature effects on polarization-dielectric loss- Local field-Clausius Mosotti relation-determination of dielectric constants.

BLOCK V:Super Conductivity

Introduction - General Properties of Superconductors - effect of magnetic field. Meissner effect - effect of current - thermal properties - entropy - specific heat - energy gap - isotope effect - London equations. AC & DC Josephson effects - applications. Type-I and Type-II Superconductors - Explanation for the Occurrence of Super Conductivity - BCS theory. High T_C superconductors-Application of Superconductors.

Books for Study:

1. Materials Science by M.Arumugam, Anuradha Agencies Publishers.,2002.

2. Solid State Physics by R L Singhal, Kedarnath Ram Nath & Co., Meerut 2003.
3. Introduction to Solid State Physics by Kittel, Willey Eastern Ltd., 2003.
4. Materials Science and Engineering by V. Raghavan, Prentice Hall of India Private Limited, New Delhi, 2004.

Books for Reference:

1. Solid State Physics by S.O.Pillai, New Age International (P) Ltd., 2002.
2. Solid State Physics by A. J. Dekker, Macmillan India, 1985.
3. Solid State Physics by HC Gupta, Vikas Publishing House Pvt. Ltd., New Delhi 2001.

Web Resource

1. <https://youtu.be/XQk25fSjKl8>
2. <https://youtu.be/93gcZEtmL7s>
3. <https://youtu.be/Wii1C2uVmEs>
4. https://youtu.be/_ttDy8XoMes
5. https://youtu.be/t_heX7jaEfE
6. <https://youtu.be/MvNAQFBppM4>
7. <https://youtu.be/iUM7dWWqeeY>
8. <https://youtu.be/QQzvQooUtJo>
9. <https://youtu.be/e4hS9CijS9U>
10. <https://youtu.be/3hB1pSjZa6c>
11. <https://youtu.be/DDLljK1ODeg>
12. <https://youtu.be/8luE9L8bj4Y>
13. <https://youtu.be/l0nvIh34eug>
14. <https://youtu.be/vnQ4uovIwR8>
15. <https://youtu.be/ptUPen8U5yE>
16. <https://youtu.be/vnQ4uovIwR8>

COURSE LEARNING OUTCOMES

After completion of the **SOLID-STATE PHYSICS**, the Learner will be able to:

CLO 1: Illustrate Types of bonds in crystals and determine the variation of inter atomic force with inter atomic spacing of crystal

CLO 2: Examine the symmetries in 3D solids and the experimental methods to unfold the same.

CLO 3: Analyze and classify magnetic materials based on their field and temperature response.

CLO 4: Differentiate between the variety of the electrical behavior of solids and determine dielectric constants of solids.

CLO 5: Demonstrate magnetic levitation; an application of superconductivity



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus -III year -VI Semester (Distance Mode)

COURSE TITLE : **NUCLEAR PHYSICS**
COURSE CODE : **BPHYS -62**
COURSE CREDIT : **5**

COURSE OBJECTIVES

While studying the **NUCLEAR PHYSICS**, the Learner shall be able to:

- CO 1: Discuss the overview of nucleus, its types, constituent particles and binding energy
- CO 2: Explain the different modes of decay and interaction of nuclear radiations with matter
- CO 3: Introduce an origin of nuclear energy and to discuss nuclear fission and fusion along with some of their applications.
- CO 4: Describe the principle and construction of Nuclear Detectors and Particle Accelerators.
- CO 5: Discuss the introduction to elementary particles, their classification, interactions, conservation laws, the associated symmetries and efforts in the direction of unification of interactions.
-

COURSE SYLLABUS

BLOCK I: Properties and structure of Nuclei

General properties of nucleus- binding energy - BE/A curve - significance - proton electron theory- proton neutron theory. Nuclear forces -characteristics -Meson theory of nuclear forces - Yukawa Potential- Nuclear models.

BLOCK II: Radio Activity

Fundamental laws of radio activity -theory of α , β and γ decay- properties of alpha, beta and gamma rays. Neutrino and its properties-electron capture. - nuclear

isomers. Mossbauer effect - applications- Radio carbon dating- radio isotopes - uses.

BLOCK III: Nuclear Reactions

Kinematics of nuclear reaction-Nuclear fission- Nuclear reactor- atom bomb uses.- Nuclear fusion -hydrogen bomb-fusion reactor -plasma confinement. Artificial transmutation-Q value of nuclear reaction-types of nuclear reaction

BLOCK IV: Nuclear Detectors and Particle Accelerators

Neutron sources and properties- Detectors-G.M.Counter-scintillation counter-bubble chamber-Wilson cloud chamber.Accelerators-cyclotron-synchrocyclotron-betatron-synchrotrons

BLOCK V: Cosmic Rays and Elementary Particles

Cosmic rays-introduction-discovery-latitude, altitude and azimuth effects-longitudinal effect-north -south effect-seasonal and diurnal changes. Primary and secondary cosmic rays-nature of cosmic rays- cosmic ray showers-Van Allen belt-origin of cosmic radiation. Elementary particles-introduction-particles and antiparticles-antimatter-the fundamental interaction-elementary particle quantum numbers. Conservation laws and symmetry-the quark model

Books for Study:

1. Atomic and Nuclear Physics by N. Subrahmanyam and Brijlal, S Chand & Co.,New Delhi,1996.
2. Nuclear Physics by Tayal D.C., Himalaya Publishing House, Mumbai,2006.
3. Nuclear Physics by R.C.Sharma, K.Nath& Co., Meerut, 2000
4. Nuclear Physics by Irving Kaplan, Narosa Publishing house, New Delhi.

Books for Reference :

1. Nuclear Physics by R.R.Roy and B.P.Nigam, New Age International (P) Ltd., NewDelhi,1997.

2. Fundamentals of Elementary Particle Physics by Longo, McGraw-Hill.
3. Nuclei and Particles by Serge., W.A. Benjamin, USA
4. Elements of Nuclear Physics by ML Pandya and RPS Yadav, Kedarnath RamNath, Meerut.

Web Resources

1. [Atomic and Nuclear Physics – a quick review\(utoronto.ca\)](#)
2. [phy008_lecturenotes_v1\(sheffield.ac.uk\)](#)
3. [NuclearPhysics.dvi\(bhattadevuniversity.ac.in\)](#)
4. [intro-nuclear-particle-Physics.pdf\(bilkent.edu.tr\)](#)
5. [Basic Nuclear and Atomic Physics\(tamu.edu\)](#)
6. NPTEL :: Physics - Nuclear Physics: Fundamentals and Applications
7. [11. III BSc 5th Sem- PHYSICS- MODERN PHYSICS - General Properties of Nuclei, Basic Ideas of Nucleus - YouTube](#)
8. [BASIC PROPERTY OF NUCLEUS \(PART-1\) - YouTube](#)
9. [Radioactivity - Modern Physics \(Part-5\) | Revision Checklist 51 for JEE Main and NEET Physics - YouTube](#)
10. [III BSc 5th Sem - PHYSICS - MODERN PHYSICS - Radioactivity Decay, Gamow's Theory of Alpha Decay - YouTube](#)
11. [NUCLEAR REACTION | TYPES OF NUCLEAR REACTION | NUCLEAR REACTION AND IT'S TYPES | PART - 1 | NOTES | - YouTube](#)
12. [Nuclear Reaction - Definition, Examples | Part-2 | Nuclear Physics BSc- 3 year - YouTube](#)

COURSE OUTCOMES

After completion of the **NUCLEAR PHYSICS**, the Learner will be able to:

CLO 1: Distinguish between different classes of nuclides and Determine the stability

of nuclides from binding energy values. describe the Meson theory of nuclear forces and nuclear models

CLO 2: Describe radioactivity and estimate the age of antiquities by applying radioactive dating.

CLO 3: Calculate the nuclear energy released during nuclear fission and

nuclear fusion. Point out the harmful effects of nuclear reactor

CLO 4: Design and demonstrate particle accelerator (cyclotron, synchrocyclotron, betatron and synchrotrons)

CLO 5: Categorize elementary particles and summarize the types of interaction between them. Specify the different conservation laws and relate it with underlying symmetries



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus -III year -VI Semester (Distance Mode)

COURSE TITLE : NANOPHYSICS
COURSE CODE : BPHYSE-62A
COURSE CREDIT : 4

COURSE OBJECTIVES

While studying the **NANOPHYSICS**, the Learner shall be able to:

CO 1: Describe basics of nanoscale systems and industry revolution by Nanotechnology

CO 2: Discuss the classification of 0D/1D/2D/3D nanostructures with examples

CO 3: Identify the techniques suitable for nanomaterial synthesis

CO 4: Demonstrate the various characterization techniques and its significance

CO 5: Apply and analyze the properties of nanomaterials to its effective Engineered applications.

COURSE SYLLABUS

BLOCK I: Introduction to Nanoscience and Nanotechnology

Introduction- Nano and Nature- Scientific Revolution, Definition of Nanotechnology, Emergence of Nanotechnology- Bulk to Nano Transition- Nanosize Effects - Size Dependent Phenomena - Bohr Exciton radius-Quantum Confinement

BLOCK II: Types of Nanostructures and Functional Nanomaterials

Definition of a Nano System - Types of Nanocrystals-One Dimensional (1D)-Two Dimensional (2D) -Three Dimensional (3D) Nanostructured Materials - Quantum Dots (0 D) - Quantum Wire - Core/Shell Structures. Carbon (Fullerene, CNT, Graphene), Noble Metals (Au, Ag), Metal Oxides (TiO₂, SnO₂, ZnO), Semiconductors (CdS, CdSe, CdTe), Magnetic Nanoparticles, Semiconductor Nanocomposites (Si:Ge):

BLOCK III: Synthesis of Nanomaterials

Physical Method: Ball Milling, Sputter Deposition, Ion Beam Techniques. Chemical Method: Wet Chemical Synthesis - Sol-Gel Processing, Co- Precipitation, Hydrothermal, Chemical Bath Deposition -Vapour Method: Thermal Evaporation - Chemical Vapor Deposition (CVD)

BLOCK IV: Characterization Techniques

Powder X-Ray Diffraction - UV-Vis Absorption Spectroscopy-Photo Luminescence - Scanning Electron Microscopy (SEM) - Transmission Electron Microscopy (TEM).

BLOCK V: Applications of Nanomaterials

Applications in Physics: Nanoelectronics, Quantum Dot and Dye Sensitized Solar Cells, Photovoltaics, Photocatalytic Applications, CNT Based Transistor and Field Emission Display - Applications in Other Fields of Science: Nanosensors, Nanomedicine, Nanocoatings, Nanopaints

BOOKS FOR STUDY

1. Nanostructures and Nanomaterials. GuoZhong Cao., Imperial College Press, U.K, 2004.
2. Nano Materials. Viswanathan. B. Narosa, India,2010.
3. Nano: The Essentials. Pradeep T. Tata Mcgraw Hill, New Delhi, 2007.

BOOKS FOR REFERENCE

1. A Hand Book on Nanophysics. John D. Miller. Dominant, India, 2008.
2. Introduction to Nanotechnology. Charles P. Poole, Jr., Frank J. Owens. Wiley, New Delhi, 2009.
3. Nanotechnology- Basic Science and Emerging Technologies, Mick Wilson, Kamalikannangora Geoff Smith, Michelle Simmons, Burkhard Raguse, Overseas, New Delhi,2005.

Web Resources

1. <https://en.wikipedia.org/wiki/Nanotechnology>
2. <https://ec.europa.eu/jrc/en/research-topic/nanotechnology>
3. <http://www.hse.gov.uk/nanotechnology/>
4. <https://www.nano.gov/nanotech-101/>

5. <http://www.crnano.org/whatis.htm>
6. <http://www.nnci.net>
7. <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/nanotechnologies>
8. <http://www.research.ibm.com/pics/nanotech/defined.shtml>
9. <https://www.nsf.gov/crssprgm/nano/>

COURSE OUTCOMES

After completion of the **NANOPHYSICS**, the Learner will be able to:

CLO 1: Interpret the Definition of Nanotechnology and Emergence of Nanotechnology and integrate and assess the chemical and physical properties of materials into nanoscale dimension.

CLO 2: Analyze and differentiate micro and nano structured materials based on Mechanical, Electrical, Optical and Dielectric properties.

CLO 3: Explain the synthesis of nanoparticles through simple, facile and cost-effective approach.

CLO 4: Design and demonstrate the various characterization techniques to estimate the size and shape of as prepared nanomaterials

CLO 5: Simulate the role of nanomaterials in medicine for diagnosis, Energy conversion and photo-degradation.



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus -III year -V Semester (Distance Mode)

COURSE TITLE : LASER PHYSICS
COURSE CODE : BPHYSE-62B
COURSE CREDIT : 4

COURSE OBJECTIVES

While studying the **LASER PHYSICS**, the Learner shall be able to:

CO 1: Discuss the basics of Theory of LASER Action

CO 2: Explain the importance of Rate Equations and Solid-State Lasers

CO 3: Demonstrate the working principle of Gas and Liquid Lasers

CO 4: Describe the construction and working of Semiconductor Laser and Holography

CO 5: Categorize the applications of laser in Industry and Medicine

COURSE SYLLABUS

BLOCK I: Basic Theory

Quantum Nature of Light - Energy Levels - Thermal Equilibrium - Population- Population Inversion - Absorption - Spontaneous and Stimulated Emission - Condition for Stimulated Emission- Einstein's Coefficients - Relation Between Them - Schawlow -Towne's Threshold Condition for Laser Oscillations in Terms of Population Difference - Basic Components of a Laser- Active Medium- Pumping Agents- Different Pumping Methods- Optical Resonator- Action of Optical Resonator- Optical Resonator - Cavity Configuration - Plane Parallel Cavity- Confocal Cavity- Hemispherical and Long Radius Cavity

BLOCK II: Rate Equations and Solid State Lasers

Laser Rate Equation- Two Level System- Three Level System- Four Level System (Qualitative Treatment Only)-Qualitative Explanation of Line Broadening Mechanism - Classification of Lasers (on the Basis of Active Medium) - Solid State

Laser -Nd: YAG Laser-General Description-Structure- Energy Level Diagram - Working - Laser Beam Characteristics - Introduction- Directionality-Divergence-Coherence- Temporal and Spatial Coherence- Monochromaticity

BLOCK III: Gas and Liquid Lasers

Gas Lasers-Molecular Gas Laser (Helium Neon laser and Carbon Dioxide Laser)- General Description-Structure - Energy Level Diagram - Working - Liquid Laser - Dye Laser - Description - Energy Level Diagram - Working - Chemical Laser- HCl Laser- HF Laser

BLOCK IV: Semiconductor Laser and Holography

Semiconductor Laser - Intrinsic Semiconductor Laser - Doped Semiconductor Laser - PN Junction- Population Inversion-Energy Level Diagrams- Homojunction Laser- Diode Laser Operation- Advantages of Laser Diodes over LED. Introduction to Holography -Recording and Reconstruction of the Image - Characteristics - Applications in Holography

BLOCK V: Applications

Laser in Industry - Drilling - Cutting - Welding - Laser Printing - Lasers in Nuclear Energy - Isotope Separation - Nuclear Fusion- Lasers in Defense-Lidar - Precision Length Measurement - Velocity Measurement. Lasers in Medicine - Cancer Therapy- Laser Eye Surgery- Laser Angioplasty- Lasers in Consumer Electronics Industry -Bar Code Scanners - Lasers in Communications-Block Diagram-Basic Principles of Optical Computers-Laser Ablations.

Books for study:

1. N. Avadhanulu , An introduction to LASERS, S. Chand & Company,2001.

Books for References:

1. William T. Silfvast, Laser fundamentals, University Press, Published in South Asia by Foundation books, New Delhi, 1998
2. K. Thyagarajan and A.K. Ghatak, LASER Theory and Application, Mc Millan, India Ltd, 1984.

Web Resources

1. [Quantum Nature of Light - YouTube](#)
2. [The laser principle - YouTube](#)
3. [Type of Pumping Process in LASER - YouTube](#)
4. [Lec 21: Laser rate equation: Steady State solution1 - YouTube](#)
5. [Laser rate equations - YouTube](#)
6. [Optical Instrumentation | Gas and Liquid LASER | AKTU Digital Education - YouTube](#)
7. [Semiconductor Laser - I Device Structure - YouTube](#)
8. [Quantum Well Laser - YouTube](#)
9. [Applications of LASER-Holography - YouTube](#)
10. [APPLICATIONS OF LASER IN THE FIELD OF INDUSTRY || APPLICATIONS OF LASER || WITH EXAM NOTES || - YouTube](#)
11. [Lasers in Medical Sciences - YouTube](#)

COURSE OUTCOMES

After completion of the **LASER PHYSICS**, the Learner will be able to:

CLO 1: Interpret the Condition for Stimulated Emission and analyze the Einstein's Coefficients and Relation between them

CLO 2: Differentiate various types of lasers and their means of excitation

CLO 3: Describe the construction and working of various gas laser (Helium Neon laser

and Carbon Dioxide Laser) and their applications

CLO 4: Introduce to Holography and discuss the Recording and Reconstruction of the

Image of Hologram and its Characteristics and Applications

CLO 5: Summarize the application of Laser in various fields (Medicine, Industry, Defence and communications)



B.Sc., Physics - Syllabus -III year -VI Semester (Distance Mode)

COURSE TITLE : PRACTICAL - III
COURSE CODE : BPHYS -P3
COURSE CREDIT : 4

ANY TWELVE EXPERIMENTS ONLY

COURSE OBJECTIVES

While studying the **PRACTICAL - III**, the Learner shall be able to:

CO 1: Design a RC coupled amplifier and analyze its frequency response.

CO 2: Design and demonstrate Regulated Power Supply using Discrete components

CO 3: Construction of basic gates using discrete components.

CO 4: Design and demonstrate types of oscillators

CO 5: Demonstrate the Characteristics of LDR and UJT

List of Experiments

1. Bistable Multivibrator
2. R.C. Coupled Amplifier - Transistor single stage
3. Hartley Oscillator - Solid State
4. Colpitt's Oscillator - Solid State
5. Tuned Plate Oscillator
6. Tuned Grid Oscillator
7. Astable Multivibrator
8. Series and Parallel resonance circuits
9. Differential Circuit and Integrating Circuit
10. Clipping and Clamping Circuits

11. Study of Solar Cell
12. Logic Gates – Discrete components
13. Emitter Follower
14. IC – Regulated Power Supply
15. Transistor – Regulated Power Supply
16. Dual Power Supply
17. Square wave generator using 555 IC
18. Study of LDR
19. UJT Characteristics
20. Bridge rectifier with voltage regulation

Web Resources

1. [Bistable Multivibrator using Transistor - YouTube](#)
2. [Bistable Multivibrator Using Timer IC 555 - YouTube](#)
3. [Single Stage RC Coupled Amplifier Trainer - YouTube](#)
4. [Hartley Oscillator: Experiments - YouTube](#)
5. [#38: LC tank circuits and the Colpitts oscillator - YouTube](#)
6. [RC phase shift oscillator lab experiment - YouTube](#)
7. [About Radio ... Part 14 Local oscillator for the AM frequencies by Andy Davies - YouTube](#)
8. [Astable Multivibrator Using 555 Timer - YouTube](#)
9. [Experiment 5: Astable Multivibrator experiment \(using op-amp\) #astablemultivibrator - YouTube](#)
10. [Series and Parallel LCR Circuit Experiment - YouTube](#)
11. [lec51 - Experiment: To study op-amp based integrator and differentiator - YouTube](#)
12. [Experiment No 3 Clipper Circuits - YouTube](#)
13. [SOLAR CELL EXPERIMENT || TO STUDY CHARACTERISTICS OF SOLAR CELL || WITH PDF FILE LINK || - YouTube](#)
14. [Making Logic Gates From Discrete Components - The Learning Circuit - YouTube](#)

15. [AMC Lab | Emitter Follower Experiment | Simulation in LTspice | Part 2 - YouTube](#)
16. [How to make a Regulated Power Supply - YouTube](#)
17. [Regulated Power Supply 7805 - YouTube](#)
18. [V-I Characteristics Of Light Dependent Resistor \(Material Science Experiment 6.3\) - YouTube](#)
19. [UJT characteristics - YouTube](#)
20. [Full Wave Bridge Rectifiers - YouTube](#)

COURSE LEARNING OUTCOMES

After completion of the **PRACTICAL - III**, the Learner will be able to:

CLO 1: Define the aim of the experiment and explain the various parameters in the formula that is used to estimate the physical property of a material. Identify the equipment and get the accessories.

CLO 2: Arrange and assemble the gadgets and carry out the experiment.

CLO 3: List the observations and repeat the experiment to find the average and hence

determine the physical quantity by making use of the required formula.

CLO 4: Interpret and report the result and classify the materials based on the Measurement (or) verify a given law. Sketch the variations wherever required.

CLO 5: Analyze the results of the experiment with an aim to construct or design an equipment or a device for use in project work/research work.



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

B.Sc., Physics - Syllabus -III year -VI Semester (Distance Mode)

COURSE TITLE : PRACTICAL -IV
COURSE CODE : BPHYS -P4
COURSE CREDIT : 4

ANY TWELVE EXPERIMENTS ONLY

COURSE OBJECTIVES

While studying the **PRACTICAL - IV**, the Learner shall be able to:

- CO 1: Explore the fundamental digital concept by establishing NAND and NOR gates as Universal building blocks.
- CO 2: Design and demonstrate Regulated Power Supply using Discrete components
- CO 3: Construction of basic gates using discrete components.
- CO 4: Coding and execution for Addition and subtraction in various modes of addressing using Microprocessor 8085.
- CO 5: Apply and analyze the De Morgan's theorem and their verification

List of Experiments

1. Verification of Truth tables of IC gates: OR, AND, NOT, XOR, NOR and NAND.
2. NAND as universal building block- AND, OR, NOT
3. Verification of De Morgan's theorem.
4. Boolean Algebra -problem solving
5. Study of RS Flip-Flop.
6. Study of Shift -Registers -Serial in Parallel out.
7. Decade counter using 7490.

8. Half adder.
9. Full adder
10. Half Subtractor and Full Subtractor.
11. 4 BIT – Binary Adder & Subtractor using 7483.
12. Code converter (Binary to gray and vice versa) & Seven segment Decoder
13. Binary Counter using 7493.
14. Parity check logic.
15. Up/Down Counter using 74190
16. 8085 ALP for 8 bit Addition and Subtraction
17. 8085 ALP for One's Complement, Masking off most significant 4 bits and setting bits.
18. 8085 ALP for Two's compliment Addition and Subtraction

Web Resources

1. [Verify the Truth Tables of Logic Gates using Integrated Circuits | 12th Physics Practical - YouTube](#)
2. [Electronics Lab experiment-1 : Realization of NOT, AND, OR & X-OR gates using NAND gates \(IC-7400\) - YouTube](#)
3. [De Morgan's First Theorem | EXPERIMENT | By CBR - YouTube](#)
4. [Logic Gates, Truth Tables, Boolean Algebra AND, OR, NOT, NAND & NOR - YouTube](#)
5. [SR and D flip flop | EXPERIMENT | LOGIC CIRCUIT | BY CBR - YouTube](#)
6. [Exp 9, Study of Shift Register IC 7495 for SISO,SIPO,PISO,PIPO, Shift Right & Shift Left Operation - YouTube](#)
7. [Decade counter lab experiment ic 7490 - YouTube](#)
8. [Decade counter IC 7490 | LAB | V H Mankar - YouTube](#)
9. [19ECL37-DEC Lab- Experiment 2- Half Adder, Full adder, Half subtractor, full subtractor - YouTube](#)
10. [4-Bit binary Adder / Subtractor, BCD Adder using 7483 IC | Simulations | DE Lab VLect 7 | Malayalam - YouTube](#)
11. [Design and Implementation of Binary to Gray Code Converter - YouTube](#)
12. [Expt No: 6 Adders, Subtractors, Binary to Gray & Vice-Versa Using IC74139 III-Sem, DSD LAB 18ECL38 - YouTube](#)
13. [The 7493 IC Binary Counter - YouTube](#)

14. [Parity Generator and Checker | ECE | Unacademy Live - GATE - YouTube](#)
15. [EXPERIMENT 13: ASYNCHRONOUS 4 BIT BINARY UP / DOWN COUNTER USING IC 74192 - YouTube](#)
16. [addition of two 8 bit numbers using memory in 8085 microprocessor. 8085 programming - YouTube](#)
17. [Masking of upper 4 bits from 8 bit number - YouTube](#)
18. [2's complement of an 8 bit number in 8085 microprocessor - YouTube](#)
19. [1's and 2's complement of 8 bit data and 16 bit data in 8085 | 8085 ALP to find 1s and 2s complement - YouTube](#)

COURSE LEARNING OUTCOMES

After completion of the **PRACTICAL - IV**, the Learner will be able to:

CLO 1: Define the aim of the experiment and explain the various parameters in the formula that is used to estimate the physical property of a material. Identify the equipment and get the accessories.

CLO 2: Arrange and assemble the gadgets and carry out the experiment.

CLO 3: List the observations and repeat the experiment to find the average and hence

determine the physical quantity by making use of the required formula.

CLO 4: Interpret and report the result and classify the materials based on the Measurement (or) verify a given law. Sketch the variations wherever required.

CLO 5: Analyze the results of the experiment with an aim to construct or design an equipment or a device for use in project work/research work.



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

Allied Course Offered by the Department of Physics to Students of Mathematics and Chemistry

COURSE TITLE : ALLIED PHYSICS-1
COURSE CODE : BPHYSA- 11
COURSE CREDIT : 3

COURSE OBJECTIVES

While studying the **ALLIED PHYSICS - I**, the Learner shall be able to:

- CO 1: Describe the basics of Waves and Oscillations and their application
 - CO 2: Discuss the fundamentals of Properties of matter and their day to day Applications
 - CO 3: Explain the concept of thermal physics
 - CO 4: apply and analyze the basics of Electricity and Magnetism
 - CO 5: Demonstrate the working principle of Geometrical optical instruments
-

COURSE SYLLABUS

BLOCK I: Waves and Oscillations

Simple harmonic motion - composition of two simple harmonic motion at right angles (periods in the ratio 1:1) - Lissajou's figures - uses. laws of transverse vibrations of strings - Melde's string - transverse and longitudinal modes - Sonometer-determination of a.c frequency using sonometer (steel and brass wires). Ultrasonics - production - application and uses - reverberation - factors for good acoustics of hall and auditorium.

BLOCK II: Properties of matter

Elasticity : Elastic constants – bending of beam – Young’s modulus by non- uniform bending.

Energy stored in a stretched wire – torsion in a wire – determination of rigidity modulus by torsional pendulum – static torsion. Viscosity: Coefficient of viscosity – Poissuelle’s formula – comparison of viscosities - burette method – Stoke’s law – terminal velocity – viscosity of highly viscous liquid – lubrication. Surface tension: Molecular theory of surface tension – excess of pressure inside a drop and bubble – variation of surface tension with temperature – Jaeger’s method.

BLOCK III : Thermal Physics

Joule-Kelvin effect – Joule-Thomson porous plug experiment – theory and application. - liquefaction of gasses – Linde’s process – Helium I and II – adiabatic demagnetization. Thermodynamic equilibrium – laws of thermodynamics – entropy change of entropy in reversible and irreversible processes.

BLOCK IV: Electricity and Magnetism

Capacitor – energy of a charged capacitor - loss of energy due to sharing of charges – Magnetic field due to a current carrying conductor – Biot Savart’s Law – Field along the axis of the coil carrying current. AC current: peak, average and RMS values of ac current and voltage – power factor and current values in an ac circuit. Circuit control and protective devices -switch and its types – fuses circuit breaker and relays.

BLOCK V: Geometrical optics

Refraction – Refractive index by microscopy – air cell – refraction at grazing incidence and grazing emergence in prisms – Dispersion-combination of two small angled prisms to produce dispersion without deviation and deviation without dispersion – direct vision prism – constant deviation prism – defects of images – coma – distortion. Lens:spherical and chromatic aberration in lenses.

Books for study

1. Allied Physics by R. Murugesan, S.Chand & Co, New Delhi(2008).
2. Waves and Oscillations by Brijlal and N. Subramanyam, Vikas Publishing house,New Delhi.
3. Properties of Matter by Brij Lal and N.Subramaniam, S. Chand & Co., New Delhi(1994).
4. Heat and Thermodynamics by J.B.Rajam and C.L.Arora, S.Chand & Co., 8th edition, New Delhi(1976).
5. Optics and Spectroscopy by R. Murugesan, S.Chand & Co, New Delhi, (2005).

Books for Reference

1. Fundamentals of Physics by Resnick Halliday and Walker, John Willey and Sons, Asia Pvt.Ltd., 6th edition, Singapore.
2. Text book of Sound by V.R.Khanna and R.S.Bedi, Kedharnaath Publish & Co, 1st edition, Meerut (1998).
3. Electricity and Magnetism by N.S. Khare and S.S. Srivastava, Atma Ram & Sons, 10th Edition, New Delhi (1983).
4. Optics by D.R. Khanna and H.R. Gulati, S. Chand & Co., New Delhi (1979).

Web Resources

1. Simple harmonic motion - <https://www.youtube.com/watch?v=pujd7oFvO-8>
2. Composition of two SHM at right angles - <https://www.youtube.com/watch?v=-tcWmw2Ktok>
3. Lissajous figure - <https://www.youtube.com/watch?v=xrejP8ZG9Hs>
4. Law of transverse vibration of string - <https://www.youtube.com/watch?v=bVLiJ9qMH2o>
5. Melde's experiment - <https://www.youtube.com/watch?v=fqhek1wT5-s>
6. Production of ultrasonics - https://www.youtube.com/watch?v=Wbnic_2Yr9U
7. Magnetostriction method - <https://www.youtube.com/watch?v=8c2ZXnobKhs>
8. Piezoelectric effect - <https://www.youtube.com/watch?v=mD1Vyh9FMq0>
9. Inverse piezoelectric effect - <https://www.youtube.com/watch?v=pnvpsl3bzwQ>
10. Application of ultrasonic - https://www.youtube.com/watch?v=T_ibVBBaxwI
11. Reverberation - <https://www.youtube.com/watch?v=kL6AyX0FXRs>
12. Reverberation time - <https://www.youtube.com/watch?v=94NzKCse4N0>

13. Sabine's formula - <https://www.youtube.com/watch?v=EGUrtKe9seM>
14. Factors affecting acoustics of building - https://www.youtube.com/watch?v=sICLMbE_6vo
15. Stress and strain - <https://www.youtube.com/watch?v=3sgcb7ImNFw>
16. Hooke's law - <https://www.youtube.com/watch?v=BGQKjmgRjQs>
17. Different moduli of elasticity - <https://www.youtube.com/watch?v=TMP0degeWvg>
18. Poisson's ratio - <https://www.youtube.com/watch?v=I4UkkQEUUMI>
19. Energy stored in stretched wire - <https://www.youtube.com/watch?v=pBSfQ2HjZVQ>
20. Bending of beams - <https://www.youtube.com/watch?v=1WwpzH02ujs>
21. Theory of non uniform bending - https://www.youtube.com/watch?v=WN9k_IRTQQw
22. Determination of young's modulus - <https://www.youtube.com/watch?v=x4AI3bWk61w>
23. Torsion of a wire - <https://www.youtube.com/watch?v=mhRH96SA7M4>
24. Determination of rigidity modulus - <https://www.youtube.com/watch?v=wWW9rRWqbTc>
25. Coefficient of viscosity - https://www.youtube.com/watch?v=97a_ZOUtNo8
26. Streamline flow - <https://www.youtube.com/watch?v=nDBhCFS7ggw>
27. Turbulent flow - <https://www.youtube.com/watch?v=1C1jP4ksiRw>
28. Reynolds number - <https://www.youtube.com/watch?v=FdpPabyn6Ig>
29. Poiseuille's law - <https://www.youtube.com/watch?v=jHg2G77P40c>
30. Stokes law - <https://www.youtube.com/watch?v=ybEMFkPaXeQ>
31. Molecular theory of surface tension - https://www.youtube.com/watch?v=gP4_Y0lAjkm
32. Excess pressure inside a liquid drop - <https://www.youtube.com/watch?v=A3kvpLOtzsc>
33. Jaeger's method - <https://www.youtube.com/watch?v=hDXoCYSeut4>
34. Kinetic theory and its postulates - https://www.youtube.com/watch?v=o3f_VJ87Df0
35. Vanderwaal's equation of state - <https://www.youtube.com/watch?v=XcJtXTTZiGc>
36. Derivation of critical constant - <https://www.youtube.com/watch?v=tJABZMr6JpM>
37. Joule - Kelvin effect - <https://www.youtube.com/watch?v=y8fAdT97ahA>
38. Porous plug experiment - <https://www.youtube.com/watch?v=xuCqtm1OVc>
39. Linde's process - <https://www.youtube.com/watch?v=HmGDnaKZxxU>
40. Adiabatic demagnetization - <https://www.youtube.com/watch?v=fLrCtXwhDMU>
41. Helium I and II - <https://www.youtube.com/watch?v=IjiFxyKpXBU>

42. Zeroth law of thermodynamics - <https://www.youtube.com/watch?v=10LJ1yqRx6U>
43. First law of thermodynamics - <https://www.youtube.com/watch?v=f4Qzpq-0cs0>
44. Reversible and irreversible process - <https://www.youtube.com/watch?v=hpur62rjYuw>
45. Third law of thermodynamics - <https://www.youtube.com/watch?v=L3HECVXhLZI>
46. Carnot engine - <https://www.youtube.com/watch?v=1havV-LB0dA>
47. Entropy in carnot cycle - <https://www.youtube.com/watch?v=-dcVMGNfCpk>
48. Capacitance of a conductor - <https://www.youtube.com/watch?v=3c7XrhZaUk8>
49. Energy of a charged capacitor - <https://www.youtube.com/watch?v=2TOU50Wz4o8>
50. Energy loss due to sharing of capacitors - <https://www.youtube.com/watch?v=Tp6A98i3uJ0>
51. Maxwell's screw rule - <https://www.youtube.com/watch?v=gg45fXtpWeE>
52. Biot savart's law - https://www.youtube.com/watch?v=DjYn5_6K4hY
53. Emf due to rotation of coil - <https://www.youtube.com/watch?v=wPIucuBFHeA>
54. Rms, effective value - <https://www.youtube.com/watch?v=-nITJzYEsd8>
55. Mean, average value of A.C - <https://www.youtube.com/watch?v=QBQBdSwh8k4>
56. Power in A.C circuit - <https://www.youtube.com/watch?v=tK9AwJPq9jI>
57. Wattless current - <https://www.youtube.com/watch?v=yakLG6Pu6dg>
58. Circuit breaker and isolators - <https://www.youtube.com/watch?v=8QLVvyNfEgc>
59. Relay coil - <https://www.youtube.com/watch?v=n9renPKEtUc>
60. Refraction - https://www.youtube.com/watch?v=v5SuSB_93FM
61. Refractive index - <https://www.youtube.com/watch?v=4heHz65oVsI>
62. Critical angle - <https://www.youtube.com/watch?v=5bkiQob8ikc>
63. Application of refraction of light - <https://www.youtube.com/watch?v=0TtFwGH55EI>
64. Refraction through a prism - https://www.youtube.com/watch?v=-1Zes_RGP5I
65. Deviation without dispersion - https://www.youtube.com/watch?v=_M4aXmx9cvI
66. Direct vision spectroscopy - <https://www.youtube.com/watch?v=64C7e3bATgQ>
67. Constant deviation prism - https://www.youtube.com/watch?v=lHJJc4r_z20
68. Comatic aberration - https://www.youtube.com/watch?v=8wIJJd4J7_k
69. Spherical aberration - <https://www.youtube.com/watch?v=hQ4jJrXZS84>

COURSE OUTCOMES

After completion of the **ALLIED PHYSICS-I**, the Learner will be able to:

CLO 1: Demonstrate conceptual understanding of the fundamental Physics principles.

CLO 2: Explain the concept of elasticity and identify the materials suitable for a application

CLO 3: Apply analyze the laws of Thermodynamics and their practical applications

CLO 4: Demonstrate the working principle of Field along the axis of the coil carrying current using – Biot Savart's Law

CLO 5: Construct and demonstrate combination of two small angled prisms to produce dispersion without deviation and deviation without dispersion



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

Allied Course Offered by the Department of Physics to Students of Mathematics and Chemistry

COURSE TITLE : ALLIED PHYSICS-II
COURSE CODE : BPHYSA-22
COURSE CREDIT : 3

COURSE OBJECTIVES

While studying the **ALLIED PHYSICS - II**, the Learner shall be able to:

CO 1: Discuss the fundamental properties of light

CO 2: Describe the structure of atom with various atom models

CO 3: Interpret the overview of nucleus, its types, constituent particles, binding energy and the nuclear process of radioactivity.

CO 4: Explain the basics of Elements of relativity and quantum mechanics

CO 5: Discuss the fundamental of Electronics and their applications.

COURSE SYLLABUS

BLOCK I : Physical Optics

Velocity of light - Michelson's method. Interference: Colours of thin films -air wedge - determination of diameter of a thin wire by air wedge - test for optical flatness - Diffraction - Fresnel's explanation of rectilinear propagation of light - theory of transmission grating - Normal incidence. Polarization - double refraction - optical activity - polarimeter.

BLOCK II : Atomic Physics

Atom model – vector atom model – electron, spin, quantum numbers – Pauli’s exclusion principle – Electronic configuration of elements and periodic classification of elements – various quantum numbers – Magnetic dipole moment of electron due to orbital and spin motion – Bohr magneton – spatial quantisation – Stern and Gerlach experiment.

BLOCK III : Nuclear Physics

Nuclear model – liquid drop model – magic numbers - shell model – Nuclear energy – mass defect – binding energy. Radiation detectors – ionization chambers – GM Counter – Fission Controlled and Uncontrolled chain reaction – nuclear reactor – Thermonuclear reactions – stellar energy.

BLOCK IV: Elements of relativity and quantum mechanics

Postulates of theory of relativity – Lorentz transformation equations – derivation – length contraction – Time dilation-Mass energy equivalence – uncertainty principle – Postulates of wave mechanics – Schrodinger’s equation – application to a particle in a box.

BLOCK V: Electronics

Basic Electronics: Zener diode – voltage regulator – LED – Transistor RC coupled amplifier – feedback principle – condition for oscillation – phase shift oscillator – Wein’s bridge oscillator.

Digital Electronics: NAND and NOR gates – Universal building blocks. Boolean algebra – Demorgan’s theorem – verification – elementary ideas of ICs – SSI , MSI, LSI and VLSI – Half adder, Full adder, Half Subtractor and Full subtractor.

Books for study

1. Allied Physics by R. Murugesan, S.Chand & Co, New Delhi(2008).
2. Allied Physics by K. Thangaraj and D. Jayaraman, Popular Book Depot, Chennai(2004).
3. Text book of Optics by Brijlal and N. Subramanyam, S.Chand & Co, New Delhi(2002).
4. Modern Physics by R. Murugesan, S.Chand & Co, New Delhi (2005).
5. Applied Electronics by A. Subramaniyam, National Publishing Co., 2nd Edition, 126

Chennai(2001).

Books for Reference

1. Fundamentals of Physics by Resnick Halliday and Walker, John Willey and Sons, Asia Pvt.Ltd., 6th Edition, Singapore.
2. Optics by D.R. Khanna and H.R. Gulati, S. Chand & Co., New
3. Delhi (1979).
4. Concepts of Modern Physics by A.Beiser, Tata McGraw Hill Publication, New Delhi(1997).
5. Digital Fundamentals by Thomas L.Floyd, Universal Book Stall – New Delhi (1998).

Web Resources

1. <https://ncert.nic.in/ncerts/l/leph201.pdf>
2. <https://books.google.co.in/>
3. <https://rb.gy/orlmk8>
4. <https://www.analog.com/>
5. <http://www.ee.surrey.ac.uk/>
6. <https://digitalcommons.unl.edu/>
7. <https://www.khanacademy.org/>
8. <https://open.umn.edu>

COURSE LEARNING OUTCOMES

After completion of the **ALLIED PHYSICS-II**, the Learner will be able to:

CLO 1: Demonstrate and determine the optical activity of materials using the properties of light (Polarization)

CLO 2: Classify the elements on the basics of electronic configuration and periodic classification of elements

CO 3: Identify different types of nuclides. Estimate binding energy of the nucleons from mass defect and. Calculate the nuclear energy released during nuclear fission and nuclear fusion. Point out the harmful effects of nuclear reactor.

CO 4: Explain the Postulates of wave mechanics and discuss the Schrodinger's equation and their application.

CLO 5: Design and demonstrate the Zener diode as a voltage regulator and design logic circuits for simplified Boolean expressions

NON-MAJOR ELECTIVE COURSE TO OTHER MAJOR STUDENTS



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

COURSE TITLE	:	BASIC PRINCIPLE OF PHYSICS
COURSE CODE	:	BPHYS-NE1
COURSE CREDIT	:	2

COURSE OBJECTIVES

While studying the **BASIC PRINCIPLE OF PHYSICS**, the Learner shall be able to:

CO 1: Explain the fundamentals of mechanics

CO 2: Discuss and demonstrate applications of heating principle

CO 3: Describe the basics of Sound and Optics

CO 4: Interpret the application of GeoPhysics and Medical Physics

CO 5: analyze the applications of Space science and Communication

COURSE SYLLABUS

BLOCK I : Mechanics

Force - Weight - Work - Energy - Power - Horsepower - Centrifuge - Washing machine

BLOCK II : Heat

Variation of boiling point with pressure - Pressure cooker - Refrigerator - Air conditioner - Principle and their capacities - Bernoulli principle - Aero plane

BLOCK III : Sound and Optics

Sound waves - Doppler effect - Power of lens - Long sight and short sight - Microscope - Telescope - Binocular - Camera

BLOCK IV : GeoPhysics and Medical Physics

Earthquake - Richter scale - thunder and lightning - Lightning arrestors - Cosmic

showers – X-rays – Ultrasound scan – CT scan – MRI scan

BLOCK V : Space science and Communication

Newton's law of gravitation – Weather forecasting and communication satellites – Indian satellites – Electromagnetic spectrum – Radio waves – AM and FM transmission and reception

Books for Study

1. The Learner's series – Everyday science – Published by INFINITY BOOKS, New Delhi
2. The Hindu speaks on Science, Vol I & II, Kasturi & Sons, Chennai.

Books for Reference

1. Fundamentals of Physics by D. Halliday, R. Resnick and J. Walker, 6th edition, Wiley, NY (2001).
2. Physics, Vols I, II, III by D. Halliday, R. Resnick and K.S. Krane, 4th Edition, Wiley, New York (2001).
3. The Feynmann Lectures on Physics Vols I, II, III by R.P. Feynmann, R.B. Leighton & M. Sands, Narosa, New Delhi (1998).

Web Resources

1. [What is mechanics? - YouTube](#)
2. [Heat and Thermodynamics | A-Level Physics | Doodle Science - YouTube](#)
3. [Light wave vs Sound wave - YouTube](#)
4. [What is Geophysics? - YouTube](#)
5. [What is Medical Physics? - YouTube](#)
6. [Basic Sciences in Space, Science Communication & Computational Physics - YouTube](#)

COURSE OUTCOMES

After completion of the **BASIC PRINCIPLE OF PHYSICS**, the Learner will be able to:

CLO 1: Demonstrate conceptual understanding of the fundamental Physics principles.

CLO 2: Discuss the working principle of Refrigerator and Air conditioner using laws of thermodynamics

CLO 3: Construct and Demonstrate the working principle of Microscope and Telescope

CLO 4: Apply and analyze the applications of Ultrasound scan, CT scan and MRI

Scan

CLO 5: Classify the working principle of AM and FM transmission and reception



Tamil Nadu Open University
Department of Physics
School of Science,
Chennai - 15

COURSE TITLE : ENERGY PHYSICS
COURSE CODE : BPHYS- NE1
COURSE CREDIT : 2

COURSE OBJECTIVES

While studying the **ENERGY PHYSICS**, the Learner shall be able to:

CO 1: Classify the various types of energy

CO 2: Identify the importance of conservation of energy and the need for alternate source of energy

CO 3: List out the merits and demerits of Conventional Energy sources

CO 4: Discuss the fundamentals and applications of Windenergy

CO 5: Interpret the needs of other energy sources

COURSE SYLLABUS

BLOCK I: Solar energy

Conventional Energy sources - Renewable Energy sources- solar energy - solar radiation and its measurements- solar energy collectors- parabolic collector- storage of solar energy

BLOCK II: Applications of solar energy

Solar water heater- solar driers- solar cells- solar electric power generation- solar distillation- solar pumping - solar cooking

BLOCK III: Wind energy

Basic principles of wind energy conversion- power in the wind - forces in the

Blades- wind energy conversion- Advantages and disadvantages of wind energy conversion systems (WECS) Energy storage- Applications of wind energy

BLOCK IV: Oceanic energy

Energy from the oceans- Energy utilization- Energy from tides- Basic principle of tidal power - Utilization of tidal energy

BLOCK V: Energy from other sources

Chemical energy - Nuclear energy - Energy storage and distribution

Books for study

1. Non-conventional sources of energy by G.D. Rai, 4th edition, Khanna Publishers, New Delhi (1996).
2. Solar Energy, Principles of thermal collection and storage by S.P.Sukhatme 2nd edition, Tata McGraw-Hill Publishing Co. Ltd., New Delhi (1997).

Book for reference

1. Energy Technology by S.Rao and Dr. Parulekar

Web Resources

1. [Solar Energy Basics | NREL](#)
2. [Applications of Solar Energy - YouTube](#)
3. [Wind Energy Basics | NREL](#)
4. [Ocean Energy | Minesto](#)
5. [Forms of Energy - YouTube](#)

COURSE LEARNING OUTCOMES

After completion of the **ENERGY PHYSICS**, the Learner will be able to:

CLO 1: Describe what energy and work mean in Physics and how they are related to each other.

CLO 2: Describe the environmental impact of the fossil fuels and the need for cleaner sources of energy.

CLO 3: Summarize about all proposed renewable energy technologies

CLO 4: Explain the production of electricity from renewable sources of energy

CLO 5: Apply and analyze the aware of the importance of sustainable energy.
