



## About Us

### Department Profile

The Department of Physics was established in September 1981 when it started B.Sc. with Mathematics, Physics and Chemistry combination both in Telugu and English media. At present, the department is offering B.Sc. with the following combinations of traditional and self-financing courses.

- B.Sc.,
1. Mathematics, Physics and Chemistry (EM)
  2. Mathematics, Physics and Statistics (EM)
  3. Mathematics, Physics and Computer Science (EM)

In view of the growing employment opportunities for Physics and its emergence as a subject of academic importance M.Sc. Physics was started in 2005.

There are 4 highly qualified and experienced faculty members in the department. It is actively involved in taking care of the academic needs of 493 students in the department. The department is buzzing with research activity with S.K. University-recognized Research Centre established in 2010.

Until the academic year 1997-1998, Board of Studies for Physics prescribed the curriculum for the subject for colleges under University jurisdiction. From the year 1998-1999 A.P. State Common Core syllabus was followed as per the direction of APSCHE, Hyderabad, until June 2005. But after attaining the Autonomous status in 2005, the college started designing the curriculum keeping the changing needs of society. Introduction of “Applications of Physics in Daily Life” as one of the papers of study under Choice Based Inter Disciplinary Electives for B.A. and B.Com., students is a decision taken in this direction.

In order to provide immediate learning resources for the benefit of the students, the department is maintaining a library with more than 150 titles. Besides, the department has two well-equipped laboratories for the UG students. The labs have Geiger Muller Counter to study radio activity, Abbe Refractometer to measure Refractive index of liquids, D.C. Operators to determine dielectric constant and a separate workshop for preparing practical kits independently. There is two non-teaching technical support staff assisting the students in the practicals.

The members of the faculty are using modern teaching methods aided by LCD projector, OHP and audio visual charts. The department constantly monitors the progress of the students by enriching their knowledge by conducting slip-tests, internal exams, class seminars, subject-related quiz programmes and group discussions. Remedial coaching is also offered to the slow learners. The department organized a national seminar on “Emerging Materials and Technologies” in October 2010.

Apart from providing quality education to the students, the department is also involving them actively to participate in various extension activities like health and blood donation camps, clean and green programmes etc. It is also extending commendable service to the needy and deserving students by providing financial assistance to enable them to complete their degree courses successfully and also to join higher learning institutions. The department successfully encouraged and guided the students to apply for All India Merit Scholarship-Inspire as a result of which three of its students were awarded merit scholarships to the tune of Rs. 7,20,000/- by the Department of Science and Technology, Government of India for the academic years from 2009-10 to 2011-12.

The department has resolved to

- Increase the number of merit students for All India Merit Scholarship - Inspire
- Organize two day national conference on “Recent Trends in Modern Materials”
- Introduce the specialization of Material Science at the PG level
- Have collaboration with industries /institutions
- Start Inter Disciplinary Certificate courses with the potential for self-employment – ‘Mobile Mechanism’ and ‘TV Mechanism’.





### M. Sc Physics

In view of the growing employment opportunities for Physics and its emergence as a subject of academic importance M.Sc. Physics was started in 2005 with 24 + 3 (Counseling quota + Management Quota). Later the strength is increased by 30 + 6 (Counseling quota + Management Quota). The course is successfully run up to 2020. In 2020 government of Andhra Pradesh stopped fee reimbursement to PG courses in all private colleges. Due to this reason, the students does not interested to joined PG courses in our college. The admissions in PG course is temporarily closed from the academic year 2021-22.







**Department of Physics**

**SRI SAI BABA NATIONAL DEGREE COLLEGE:: ANANTAPUR**

**Faculty**



Dr. K. P. Venkateswara Rao, Assistant Professor and Head, who has 26 years of teaching experience, have participated in national and international seminars and workshops. He is specialized in teaching Modern Physics and Optics. He made significant mark in the progress of the Department. Exhibiting enormous commitment and sincerity, he has trained the students on the Practical areas of Physics in a learner-centered approach.

**CURRICULUM VITAE**

**Dr. K.P. Venkateswara Rao**  
 S/O K.P. Sivasankara Rao  
 # 10-513-19.  
 Chandrapriya Residency  
 Adimurthi Nagar  
 Anantapur –515001  
 Andhra Pradesh, INDIA.

E-mail : [kpvrkpvr302@gmail.com](mailto:kpvrkpvr302@gmail.com)  
 Mobile No: +91 – 9182173657

**DESIGNATION** : Assistant Professor of Physics.  
 S.S.B.N Degree & P.G College (Autonomous)  
 Anantapur - 515001

**ACADEMIC PROFILE** :

<b>2025</b>	Ph.D in Physics Dravidian University, Kuppam	<b>Black box design for automotive vehicles</b>
<b>2008</b>	M. Phil in Physics First class, Alagappa University Karaikudi Tamilnadu	<b>Liquid Crystals, Solid State Physics</b>
<b>1998</b>	Master of Science (Physics) Sri Krishnadevaraya University, Anantapur - 515001	

**ACADEMIC EXPERIENCE:**

<b>COURSE TOUGHT</b>	<b>NAME OF THE COLLEGE</b>	<b>DURATION</b>
B.Sc., Physics	S.S.B.N Degree & P.G College(Autonomous) Anantapur - 515001	26 years
M.Sc., Physics	S.S.B.N Degree & P.G College(Autonomous) Anantapur - 515001	15 years

**Computer proficiency:**

- Computer packages: MS-Office 2000 (Word, Excel, PowerPoint).

**IV. WORKSHOPS / CONFERENCES/ SEMINARS ATTENDED:**

1. Participated in the national seminar on " *Emerging Materials and Techniques (EMT-2010)*" conducted by S.S.B.N Degree (Autonomous) & P.G College, Anantapur from 9<sup>th</sup> – 10<sup>th</sup> October, 2010..
2. Participated in the National Seminar on " *Nano Materials and Global Perspectives*" conducted by Govt. College (M), Anantapur, from 30-31 January 2015.
3. Participated in two day national conference on " *ICT Empowered Teaching, Learning and Evaluation*" organized by IQAC, SSBN Degree College, Anantapur on 16<sup>th</sup> & 17<sup>th</sup> December 2016.
4. Participated in UGC sponsored one day workshop on " *Non-Communicable Diseases*" organized by Red Ribbon Club, SSBN degree college, Anantapur on 26-02-2020.
5. Participated in UGC Sponsored a two day national seminar on " *Emerging Materials and Applications*" organized by SSBN Degree College, Anantapur on 11<sup>th</sup> and 12<sup>th</sup> March 2020.

**VIII. ADDITIONAL RESPONSIBILITIES**

1. Head, School of Physical Sciences
2. Coordinator, RUSA 2.0
3. Member, WEC
4. Member, Disciplinary Committee
5. Member, Invitation Committee
6. Convener, CDC

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Dr. M. Baba Fakruddin, another Assistant Professor and a senior faculty with 18 years of experience. He is specialized in teaching Electricity and Magnetism. He has participated in national seminars and workshops. He is the In-charge of RUSA 2.0 digital block.



**CURRICULUM VITAE**

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**Dr. M Baba Fakruddin**

E-mail : [babafakruddin490@gmail.com](mailto:babafakruddin490@gmail.com)

S/O M Kullayappa

Mobile No: +91 – 9866933490

# 12-2-125.

Ashok Nagar

Anantapur –515001

Andhra Pradesh, INDIA.

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**DESIGNATION** : Assistant Professor of Physics.  
S.S.B.N Degree & P.G College (Autonomous)  
Anantapur - 515001

**ACADEMIC PROFILE** :

<b>2025</b>	Ph.D in Physics Dravidian University, Kuppam	Wireless enabled advanced ICU management and control using PIC
<b>2008</b>	M.Phil in Physics First class, Periyar University, Salem Tamilnadu,	Spectroscopic properties of $\text{Ln}^{3+} : \text{Bi}_4 \text{Ge}_3 \text{O}_{12}$ and $\text{Nd}^{3+} : \text{Bi}_4 \text{Si}_3 \text{O}_{12}$ single crystals
<b>2006</b>	Master of Science (Physics) PGP College, Namakkal, Tamilnadu	

**ACADEMIC EXPERIENCE:**

<b>COURSE TOUGHT</b>	<b>NAME OF THE COLLEGE</b>	<b>DURATION</b>
B.Sc., Physics	S.S.B.N Degree & P.G College(Autonomous) Anantapur - 515001	18 years
M.Sc., Physics	S.S.B.N Degree & P.G College(Autonomous) Anantapur - 515001	10 years

**Computer proficiency:**

- Computer packages: MS-Office 2000 (Word, Excel, PowerPoint).

**IV. WORKSHOPS / CONFERENCES/ SEMINARS ATTENDED:**

1. Participated in the national seminar on “ *Emerging Materials and Techniques (EMT-2010)*” conducted by S.S.B.N Degree (Autonomous) & P.G College, Anantapur from 9<sup>th</sup> – 10<sup>th</sup> October, 2010..
2. Participated in the National Seminar on “*Nano Materials and Global Perspectives*” conducted by Govt. College (M), Anantapur, from 30-31 January 2015.
3. Participated in two day national conference on “*ICT Empowered Teaching, Learning and Evaluation*” organized by IQAC, SSBN Degree College, Anantapur on 16<sup>th</sup> & 17<sup>th</sup> December 2016.
4. Participated in UGC sponsored one day workshop on “*Non-Communicable Diseases*” organized by Red Ribbon Club, SSBN degree college, Anantapur on 26-02-2020.
5. Participated in UGC Sponsored a two day national seminar on “*Emerging Materials and Applications*” organized by SSBN Degree College, Anantapur on 11<sup>th</sup> and 12<sup>th</sup> March 2020.

**VIII. ADDITIONAL RESPONSIBILITIES**

1. Program Officer, NSS Unit-1
2. In-charge, RUSA 2.0 digital block.
3. Member, RUSA 2.0
4. Member, WEC
5. Member, Disciplinary Committee
6. Member, Invitation Committee
7. Member, CDC

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Dr. M. Nagendra Vara Prasad, Assistant Professor, with more than 17 years of experience, published 15 research articles in national and international journals. He has participated in national seminars and workshops and presented papers at national and international seminars and workshops. He is also serving the college and the students in the capacity of In-charge, help desk of the college. He has also qualified *APSET*.

### CURRICULUM VITAE

**Dr. M. Nagendra Vara Prasad**

S/O Late M. Thulanjana Rao

# 16-416.

Uma Nagar

Anantapur –515001

Andhra Pradesh, INDIA.

E-mail : [buddu31179@gmail.com](mailto:buddu31179@gmail.com)

Mobile No: +91 – 86392 04909

**DESIGNATION** : Assistant Professor of Physics.  
S.S.B.N Degree & P.G College (Autonomous)  
Anantapur - 515001

### ACADEMIC PROFILE :

2018	Ph.D., in Physics Sri Krishnadevaraya University Anantapur, A .P. INDIA.	<b>Title:</b> <i>DC reactive Magnetron Sputtering: Growth and Characterization of Cu<sub>2</sub>O, Ag<sub>2</sub>O and Ag-Cu<sub>2</sub>O oxide thin films.</i>
2013	M.Phil in Physics Sri Krishnadevaraya University Anantapur, A .P. INDIA	<b>Title:</b> <i>Effect of Ammonia Concentration on Characterization of Chemical Bath deposited (CBD) Cadmium Sulphide (CdS) Thin Films</i>
2007	Master of Science in Physics (67%), SSBN Degree & PG College, Sri Krishnadevaraya University Anantapur, A .P. INDIA	

### ACADEMIC EXPERIENCE:

COURSE TOUGHT	NAME OF THE COLLEGE	DURATION
M.Sc., Physics	S.S.B.N Degree & P.G College(Autonomous) Anantapur - 515001	14 years
B.Sc., Physics	S.S.B.N Degree & P.G College(Autonomous) Anantapur - 515001	1 year

**Extension lectures for B.Sc., Physics & M. Sc Physics, in**

- PVKK Degree & P.G College, Anantapur, INDIA (Affiliated to S.K.University)
- Sri Sai Degree & P.G College, Anantapur, INDIA (Affiliated to S.K.University)

**Computer proficiency:**

- Computer packages: MS-Office 2000 (Word, Excel, PowerPoint).
- C language

**PUBLICATIONS:**

**I. PUBLICATIONS IN JOURNALS**

1. **M. Nagendra Vara Prasad**, Y. Munikrishna Reddy, B. Samarpana Rao and M. V. Lakshmaiah, "*Development of Electrical and Microstructure Properties in TiO<sub>2</sub> Thin Films: DC Reactive Method*", International Journal of Advanced Trends in Engineering, Science and Technology, Vol. 5, pp 17-21, ISSN:2456-1126, **2020**
2. **M Nagendra Vara Prasad**, Y Munikrishna Reddy and T Lakshmi Narasappa, "*Structural and Luminescence Properties in Dy<sup>3+</sup> Doped Antimony-Strontium-Magnesium-Oxyfluoroborate Glasses*", Bulletin of Pure and Applied Sciences, Vol.39 D (Physics), No.1,P.111-116, ISSN 2320 3218, January-June **2020**
3. **M. Nagendra Vara Prasad**, Y. Munikrishna Reddy, B. Samarpana Rao, , M.V. Lakshmaiah and Panem Charan Arur , "*Partial oxygen effect on the optical behaviour of AlCu<sub>2</sub>O thin films using the reactive sputtered method*" Materials Today's Proceedings (Elsevier), Vol. 27, September **2019**
4. **M. Nagendra Vara Prasad** and Y. Munikrishna Reddy, "*Growth and characterization of Ag-Cu<sub>2</sub>O thin films: DC magnetron sputtering method*" Materials Today's Proceedings (Elsevier), Vol. 27, September **2019**
5. **Nagendra Vara Prasad M**, Munikrishna Reddy Y and Jeevan Kumar R, "*Effect of Deposition Temperature on the Physical Properties of Ag-Cu<sub>2</sub>O Thin Films by D C Magnetron Sputtering*", ISSN : 2248-9622, Vol. 7, Issue 10, ( Part -5) October **2017**, pp.11-14
6. **M. Nagendra Vara Prasad** and Y. Munikrishna Reddy, "*DC magnetron sputtering: Impact of partial O<sub>2</sub> pressure on the characteristics of Ag<sub>2</sub>O films,*" Advanced Materials Proceedings, 2(9) **2017**, 593-597.

7. **M Nagendra Vara Prasad** and Etigowni Mahojani, "*Teaching and Learning Mathematics: The Role of ICT*", NCICT-2016, IJASTEMS-ISSN: 2454-356, Volume.2, Special Issue.1, Dec.2016
8. **M. Nagendra Vara Prasad** and Y. Munikrishna Reddy, " Properties of CdS Chemically Deposited thin films on the Effect of Ammonia Concentration IOSR J. Applied Phy., Vol. 4 (4), 01-07, 2013, e-ISSN: 2278-4861
9. **M. Nagendra Vara Prasad** and Y. Munikrishna Reddy, "*Effect of Ammonia Concentration on Electrical Properties of Chemical Bath Deposited (CBD) Cadmium Sulphide (CdS) Thin Films*", J. Lab. Exp. Vol.13, PP 85-89, 2013
10. **M. Nagendra Vara Prasad** and Y. Munikrishna Reddy, "*Effect of Ammonia Concentration on Characterization of Chemical Bath Deposited (CBD) CdS Thin Films*", Asian J. Expt. Science, Vol. 27, 36, 2013
11. **M. Nagendra Vara Prasad**, Y M K Reddy, and T. Lakshmi Narasappa, "*Masking and Shifting Software for Measuring Temperature by Interfacing LM35 to P89V51 Microcontroller*", J. LE Vol-10, PP-305-315, 2010
12. **M. Nagendra Vara Prasad**, Y M K Reddy, and A. Vedavathi, "*Experiments with a Geiger-Muller (G M) Counter*", J. LE Vol-10, PP-102-110, 2010

## II. PAPERS PRESENTED INT. / NATIONAL CONFERENCES

1. **M. Nagendra Vara Prasad**, Y. Munikrishna Reddy, B. Samarpana Rao, , M.V. Lakshmaiah and Panem Charan Arur , "*Partial oxygen effect on the optical behaviour of AlCu<sub>2</sub>O thin films using the reactive sputtered method*", Proceedings of ICRAMM-2019, Vol. II, KLE DR.M.S. Sheshgiri College Of Engineering & Technology, Beloagavi, Karnataka, 12<sup>th</sup> – 14<sup>th</sup>, September 2019, PP 362-366
2. **M. Nagendra Vara Prasad** and Y. Munikrishna Reddy, "*Growth and characterization of Ag-Cu<sub>2</sub>O thin films: DC magnetron sputtering method*", Proceedings of ICRAMM-2019, Vol. I, KLE DR.M.S. Sheshgiri College Of Engineering & Technology, Beloagavi, Karnataka, 12<sup>th</sup> – 14<sup>th</sup>, September 2019, PP 6-12
3. **Nagendra Vara Prasad M**, Munikrishna Reddy Y and Jeevan Kumar R, "*Influence on Surface Morphology of Cu<sub>2</sub>O thin films by Oxygen Partial Pressure in DC Magnetron Method*", RAMP-2018, S K university, Anantapur, 24<sup>th</sup> & 25<sup>th</sup> February 2018

4. **Nagendra Vara Prasad M**, Munikrishna Reddy Y and Jeevan Kumar R, "*Optical Properties of Nanostructure CdO thin films by DC magnetron Sputtering*", NCMMW-2016, Eswari Eng. College, 2016
5. **Nagendra Vara Prasad M**, Munikrishna Reddy Y, Jeevan Kumar R, "*DC Magnetron Sputtering: Impact of Partial O<sub>2</sub> Pressure on the Characteristics of Ag<sub>2</sub>O Films*", ICMTECH-2016, New Delhi, Mar. 2016
6. **Nagendra Vara Prasad M**, Munikrishna Reddy Y, Padma Suvarna R and Farooq S, "*Optical properties of silver nano particles by reactive DC magnetron sputtering*", NSNMGP 2015, Govt. College (M), Ananthapuramu, Jan. 2015, 65-66
7. **Nagendra Vara Prasad M**, Munikrishna Reddy Y, Padma Suvarna R and Parveena S "*Effect Of Oxygen On Optical And Structural Properties Of Copper Oxide Thin Films Prepared By Dc Magnetron Sputtering*", NCETSTM 2K14, Mallareddy Eng. Clg, S'bad, Aug. 2014, 75-76
8. **Nagendra Vara Prasad M** and Munikrishna Reddy Y , "*Optical Transmittance of CuO thin films prepared by DC Magnetron Sputtering*", NCRAM-2014, Loyola Deg. College, Pulivendula, Nov.2014, 52
9. **Nagendra Vara Prasad M** and Munikrishna Reddy Y,, "*Effect of Ammonia Concentration on Optical properties of CdS Thin Films by Chemical Bath Deposition Method*", ETSM-2012, S. K. University., Anantapur, PP 23, Nov. 2012
10. **Nagendra Vara Prasad M**, Munikrishna Reddy Y, A. Vedavathi and G Parameswara Reddy, "*Microstructural Development of Mn-doped Zn<sub>1-x</sub> Polycrystals Synthesized by Co-Precipitation Technique*", Proceedings of NCNST-2011pp. 147-148, 2011
11. **Nagendra Vara Prasad M** and Munikrishna Reddy Y, "*Versatile Humidity and Temperature Detection by Interfacing AT89S51 and SHT10 Digital IC Sensor*", National Seminar on Emerging Materials & Technologies (EMT2010), SSBN Degree College, Anantapur, p 50, Oct. 2010
12. **M N V Prasad**, Y M K Reddy, , T Lakshminarasappa and A Vedavathi, "*Aromatic Amino Acid Side Chain Conformational Studies in Chemotatic Peptide Analogues Using High Resolution H-1 NMR*" National Conference on EMDT, Feb. 2009, S V Uni. TPT, p66.

**IV. WORKSHOPS / CONFERENCES/ SEMINARS ATTENDED:**

1. Participated in the national seminar on “*Emerging Materials and Techniques (EMT-2010)*” conducted by S.S.B.N Degree (Autonomous) & P.G College, Anantapur from 9<sup>th</sup> – 10<sup>th</sup> October, 2010..
2. Participated in the national seminar on “*Emerging Trends in Soft Materials (ETSM-2012)*” conducted by Sri Krishnadevaraya University, Anantapur from November, 01-02, 2012.
3. Participated in the national seminar on “*Nanomaterials: Synthesis and Applications (NSNSA-2013)*” conducted by Govt. PG College, Chindvada, Madhya Pradesh from March 04-06, 2013.
4. Participated in the national conference on “*Recent Advances in Materials Science (NCRAM-2014)*” conducted by Loyola Degree College, Pulivendula from December 17 – 18, 2014.
5. Participated in the National Seminar on “*Nano Materials and Global Perspectives*” conducted by Govt. College (M), Anantapur, from 30-31 January 2015.
6. Participated in the International Conference On “*Materials Science & Technology (ICMTech - 2016), India*” conducted by New Delhi, from March 01-03, 2016.
7. Participated in two day national conference on “*ICT Empowered Teaching, Learning and Evaluation*” organized by IQAC, SSBN Degree College, Anantapur on 16<sup>th</sup> & 17<sup>th</sup> December 2016.
8. Participated in the national seminar on “*Recent Advances in Material Physics (RAMP-2018)*” conducted by Sri Krishnadevaraya University, Anantapur from February 24-25, 2018.
9. Participated in the AICTE sponsored 2019 first international conference on “*Recent advances in materials and manufacturing*” conducted by KLE DR.M.S. Sheshgiri College of Engineering & Technology, Beloagavi, Karnataka, 12<sup>th</sup> – 14<sup>th</sup>, September 2019.
10. Participated in UGC sponsored one day workshop on “*Non-Communicable Diseases*” organized by Red Ribbon Club, SSBN degree college, Anantapur on 26-02-2020.
11. Participated in UGC Sponsored a two day national seminar on “*Emerging Materials and Applications*” organized by SSBN Degree College, Anantapur on 11<sup>th</sup> and 12<sup>th</sup> March 2020.

**ADDITIONAL RESPONSIBILITIES**

1. In-Charge of Help desk
2. Member in RUSA
3. Member in WEC

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Smt. M. Jainu Begum, Assistant professors, who joined the team latter, with 8 years of experience, is specialized in teaching Mechanics, Waves & Oscillations. She is also serving the women students on the campus as the In-charge of NCC unit.



Three of these faculty members, who have been handling PG classes for the last 16 years, are on the various academic committees including Board of Studies of other institutions.

**Technical Support/ Non-teaching Staff**



Sri U Keshavaiah  
Attender



Sri V Sivananda  
Attender



**Department of Physics**

**SRI SAI BABA NATIONAL DEGREE COLLEGE :: ANANTAPUR**

**Department Infrastructure:**

<b>S. No</b>	<b>Description</b>	<b>Quantity</b>
1.	Staff Room	1
2.	Laboratories	5 (2 UG + 3 PG)
3.	Department Library	400 Vol.
4.	Research center	1
5.	Work shop	1
6.	Computer With Internet	5
7.	LCD Projectors with screen	2
8.	OHP	3
<b>UG Labs (2)</b>		
9.	Tables	16
10.	Stools	34
11.	Black board	2
12.	Fans	7
13.	Tube lights	23
14.	Beeruva	2
15.	Wooden Beeruva	1
16.	Iron self	1
17.	S type chairs	10
18.	Computer tables	2
<b>PG Labs (3)</b>		
19.	8X4 Working Tables	9
20.	Staff Tables small	5
21.	Staff Tables Big	1
22.	Wodden Rock for components	1
23.	Glass Almara for books	1
24.	Steel Almara	1
25.	Staff S-type chairs	3
26.	Student Chairs	24
27.	Student Stools	48
28.	Plastic Chairs	8
29.	Computer Tables	2
30.	Classroom Tables	2
31.	White board	3

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Department of Physics

SRI SAI BABA NATIONAL DEGREE COLLEGE :: ANANTAPUR

Student Zone

➤ Syllabus

B.Sc. PHYSICS COURSE STRUCTURE UNDER CBCS

Year	Semester	Course	Title of the Course	Marks	No. of Hrs / Week	No. of Credits	
I	I	I	Mechanics, Waves and Oscillations	100	4	03	
			Practical Course- I	50	2	02	
	II	II	Wave Optics	100	4	03	
			Practical Course – II	50	2	02	
II	III	III	Heat and Thermodynamics	100	4	03	
			Practical Course – III	50	2	02	
	IV	IV	Electricity, Magnetism and Electronics	100	4	03	
			Practical Course – IV	50	2	02	
	V	V	Modern Physics	100	4	03	
			Practical Course –V	50	2	02	
	<b>Total No. of Courses : 05 (Five)</b>						



**S S B N DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU**

**B.Sc. PHYSICS SYLLABUS UNDER CBCS**

**For Mathematics Combinations**

[2020-21 Batch onwards]

**I Year B.Sc.-Physics: I Semester**

**Course I: MECHANICS, WAVES AND OSCILLATIONS**

**Work load: 60 hrs per semester]**

**[4 hrs/week**

**UNIT-I:**

**1. Mechanics of Particles**

**(5 hrs)**

Review of Newton's Laws of Motion, Motion of variable mass system, Motion of a rocket, Multistage rocket, Collisions, Concept of impact parameter, scattering cross-section, Rutherford scattering-Derivation.

**2. Mechanics of Rigid bodies**

**(7 hrs)**

Rigid body, rotational kinematic relations, Equation of motion for a rotating body, Angular momentum and Moment of inertia tensor, Euler equations, Precession of a spinning top, Gyroscope, Precession of the equinoxes.

**UNIT-II:**

**3. Motion in a Central Force Field**

**(12hrs)**

Central forces, definition and examples, characteristics of central forces, conservative nature of central forces, Equation of motion under a central force, Kepler's laws of planetary motion- Proofs, Motion of satellites, Basic idea of Global Positioning System (GPS), weightlessness, Physiological effects of astronauts

**UNIT-III:**

**4. Relativistic Mechanics**

**(12hrs)**

Introduction to relativity, Frames of reference, Galilean transformations, absolute frames, Michelson-Morley experiment, negative result, Postulates of Special theory of relativity, Lorentz transformation, time dilation, length contraction, variation of mass with velocity, Einstein's mass-energy relation

**UNIT-IV:**

**5. Undamped, Damped and Forced oscillations:**

**(07 hrs)**

Simple harmonic oscillator, differential equation and its solution, Damped harmonic oscillator, Forced harmonic oscillator – Their differential equations and solutions, Resonance, Logarithmic decrement, Relaxation time and Quality factor.

**6. Coupled oscillations:**

**(05 hrs)**

Coupled oscillators-Introduction, Two coupled oscillators, Normal coordinates and Normal modes- N-coupled oscillators and wave equation.

**Unit-V:**

**7. Vibrating Strings:**

**(07 hrs)**

Transverse wave propagation along a stretched string, General solution of wave equation and its significance, Velocity of transverse wave along a stretched string, Modes of vibration of stretched string clamped at ends, Overtones and Harmonics.

**8. Ultrasonics: (05 hrs)**

Ultrasonics, General Properties of ultrasonic waves, Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonics, Applications of ultrasonic waves, SONAR

**REFERENCE BOOKS:**

- B. Sc. Physics, Vol.1, Telugu Academy, Hyderabad
- Fundamentals of Physics Vol. I - Resnick, Halliday, Krane, Wiley India 2007
- Mechanics, S.G.Venkatachalapathy, Margham Publication, 2003.
- Waves and Oscillations. N. Subramanyam and Brijlal, Vikas Publications.
- Unified Physics - Waves and Oscillations, Jai Prakash Nath & Co. Ltd.
- Waves & Oscillations. S.Badami, V. Balasubramanian and K.R. Reddy, Orient Longman.

**PRACTICAL COURSE 1: MECHANICS, WAVES AND OSCILLATIONS**

Work load: 30 hrs per semester]

[2 hrs/week

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**Minimum of 6 experiments to be done and recorded:**

1. Bifilar suspension –Moment of inertia of a regular rectangular body.
2. Fly-wheel -Determination of moment of inertia
3. Rigidity modulus of material of a wire-Dynamic method (Torsional pendulum)
4. Volume resonator experiment
5. Determination of ‘g’ by compound/bar pendulum.
6. Velocity of transverse waves along a stretched string –Sonometer
7. Determination of the force constant of a spring by static and dynamic method.
8. Coupled oscillators
9. Viscosity of liquid by the flow method (Poiseuille’s method)
10. Simple pendulum- normal distribution of errors-estimation of time period and the error of the mean by statistical analysis

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**S S B N DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU**

**B.Sc. PHYSICS SYLLABUS UNDER CBCS**

**For Mathematics Combinations**

[2020-21 Batch onwards]

**I Year B.Sc.-Physics: II Semester**

**Course-II: WAVE OPTICS**

**Work load: 60 hrs per semester]**

**[4 hrs/week**

**UNIT-I Interference of light: (12hrs)**

Introduction, Superposition principle of waves Interference of light, Intensity at a point in a plane, coherent sources, Theory of interference fringes, Conditions for interference of light, Interference of light by division of wave front and amplitude, Phase change on reflection- Stokes' treatment, Lloyd's single mirror, Interference in thin films: Interference by a plane parallel film illuminated by a plane wave, Interference due to reflected light-cosine law, interference due to wedge-shaped films, colours in thin films, Newton's rings in reflected light-Theory and experiment, Determination of wavelength of monochromatic light, Michelson interferometer and determination of wavelength.

**UNIT-II Diffraction of light: (12hrs)**

Introduction, Types of diffraction: Fresnel and Fraunhofer diffractions, Distinction between Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit (normal incidence) Plane diffraction grating, Determination of wavelength of light using diffraction grating, Fresnel's half period zones, Explanation of rectilinear propagation of light, Zone plate, comparison of zone plate with convex lens. Differences between interference and diffraction.

**UNIT-III Polarization of light: (12hrs)**

Polarized light: Methods of production of plane polarized light- Double refraction, Polaroid, Brewster's law, Malus law, Nicol prism, Nicol prism as polarizer and analyzer, Quarter wave plate, Half wave plate, Plane, Optical activity, specific rotation, determination of specific rotation by Laurent's half shade polarimeter. Basic principle of LCDs

**UNIT-IV Aberrations and Fibre Optics: (12hrs)**

**Aberrations:** Monochromatic aberrations, Spherical aberration, Methods of minimizing spherical aberration, Coma, Astigmatism and Curvature of field, Distortion; Chromatic aberration-the achromatic doublet; Achromatism for two lenses (i) in contact and (ii) separated by a distance.

**Fibre optics:** Introduction to Fibers, different types of fibers, rays and modes in an optical fiber, Principles of fiber communication (qualitative treatment only), Advantages of fiber optic communication.

**UNIT-V Lasers and Holography: (12hrs)**

**Lasers:** Introduction, Spontaneous emission, stimulated emission, Population Inversion, Laser principle, Einstein coefficients, Types of lasers Ruby laser, He-Ne laser, Applications of lasers;

**Holography:** Basic principle of holography, Applications of holography

**REFERENCE BOOKS:**

- B.Sc Physics, Vol.2, Telugu Akademy, Hyderabad
- A Text Book of Optics-N Subramanyam, L Brijlal, S.Chand& Co.
- Optics-Murugesan, S.Chand& Co.
- Unified Physics Vol.II Optics, Jai PrakashNath&Co.Ltd., Meerut
- Introduction of Lasers – Avadhanulu, S.Chand& Co.
- Principles of Optics- BK Mathur, Gopala Printing Press, 1995

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**PRACTICAL COURSE II: WAVE OPTICS**

Work load: 30hrs]

[2 hrs/week

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**Minimum of 6 experiments to be done and recorded**

1. Determination of radius of curvature of a given convex lens-Newton's rings.
2. Study of optical rotation –polarimeter.
3. Dispersive power of a prism.
4. Determination of wavelength of light using diffraction grating-minimum deviation method.
5. Determination of thickness of a thin wire by wedge method
6. Determination of refractive index of liquid-Boy's method.
7. Refractive index of a liquid-hallow prism.
8. Resolving power of grating.
9. Determination of wavelength of light using diffraction grating-normal incidence method.
10. Resolving power of a telescope.

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**S S B N DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU**

**B.Sc. PHYSICS SYLLABUS UNDER CBCS**

**For Mathematics Combinations**

[2021-22 Batch onwards]

**II Year B.Sc.-Physics: III Semester**

**Course-III: HEAT AND THERMODYNAMICS**

**Work load: 60 hrs per semester]**

**[4 hrs/week**

**UNIT-I**

**1. Kinetic Theory of gases: (12 hrs)**

Kinetic Theory of gases-Introduction, Maxwell's law of distribution of molecular velocities (qualitative treatment only) and its experimental verification, Mean free path, Degrees of freedom, Principle of equipartition of energy (Qualitative ideas only), Transport phenomenon in ideal gases: viscosity, Thermal conductivity and diffusion of gases.

**UNIT-II**

**2. Thermodynamics: (12hrs)**

Introduction- Isothermal and Adiabatic processes, Reversible and irreversible processes, Carnot's engine and its efficiency, Carnot's theorem, Thermodynamic scale of temperature and its identity with perfect gas scale, Second law of thermodynamics: Kelvin's and Clausius statements, Principle of refrigeration, Entropy, Physical significance, Change in entropy in reversible and irreversible processes; Entropy and disorder-Entropy of Universe; Temperature-Entropy (T-S) diagram and its uses ; change of entropy when ice changes into steam.

**UNIT-III**

**3. Thermodynamic Potentials and Maxwell's equations: (12hrs)**

Thermodynamic potentials-Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy and their significance, Derivation of Maxwell's thermodynamic relations from thermodynamic potentials, Applications to (i) Clausius-Clayperon's equation (ii) Value of  $C_P - C_V$  (iii) Value of  $C_P/C_V$  (iv) Joule-Kelvin coefficient for ideal and Van der Waals' gases

**UNIT-IV**

**4. Low temperature Physics: (12hrs)**

Methods for producing very low temperatures, Joule Kelvin effect, Porous plug experiment , Joule expansion, Distinction between adiabatic and Joule Thomson expansion, Expression for Joule Thomson cooling, Liquefaction of air by Linde's method, Production of low temperatures by adiabatic demagnetization (qualitative), Practical applications of substances at low temperatures.

**UNIT-V**

**5. Quantum theory of radiation: (12 hrs)**

Blackbody and its spectral energy distribution of black body radiation, Kirchoff's law, Wein's displacement law, Stefan-Boltzmann's law and Rayleigh-Jean's law (No derivations), Planck's law of black body radiation-Derivation, Deduction of Wein's law and Rayleigh-Jean's law from Planck's law, Solar constant and its determination using Angstrom pyroheliometer, Estimation of surface temperature of Sun.

**REFERENCE BOOKS:**

- ❖ B.Sc Physics, Vol.2, Telugu Akademy, Hyderabad
- ❖ Thermodynamics, R.C.Srivastava, S.K.Saha&AbhayK.Jain, Eastern Economy Edition.
- ❖ Unified Physics Vol.2, Optics & Thermodynamics, Jai PrakashNath&Co.Ltd., Meerut
- ❖ Fundamentals of Physics. Halliday/Resnick/Walker.C. Wiley India Edition 2007
- ❖ Heat and Thermodynamics -N BrijLal, P Subrahmanyam, S.Chand& Co.,2012

**PRACTICAL COURSE-III: HEAT AND THERMODYNAMICS**

Work load: 30 hrs]

[2 hrs/week

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**Minimum of 6 experiments to be done and recorded:**

1. Specific heat of a liquid –Joule’s calorimeter –Barton’s radiation correction
2. Thermal conductivity of bad conductor-Lee’s method
3. Thermal conductivity of rubber.
4. Measurement of Stefan’s constant.
5. Specific heat of a liquid by applying Newton’s law of cooling correction.
6. Heating efficiency of electrical kettle with varying voltages.
7. Thermoemf- thermo couple - Potentiometer
8. Thermal behavior of an electric bulb (filament/torch light bulb)
9. Measurement of Stefan’s constant- emissive method
10. Study of variation of resistance with temperature - Thermistor.

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**S S B N DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU**

**B.Sc. PHYSICS SYLLABUS UNDER CBCS**

**For Mathematics Combinations**

[2021-22 Batch onwards]

**II Year B.Sc.-Physics: IV Semester**

**Course-IV: ELECTRICITY, MAGNETISM AND ELECTRONICS**

**Work load: 60 hrs per semester]**

**[4 hrs/week**

**UNIT-I**

**1. Electrostatics: (6hrs)**

Gauss's law-Statement and its proof, Electric field intensity due to (i) uniformly charged solid sphere and (ii) an infinite conducting sheet of charge, Deduction of Coulomb's law from Gauss law, Electrical potential-Equipotential surfaces, Potential due to a (i) dipole (ii) uniformly charged sphere

**2. Dielectrics: (6 hrs)**

Dielectrics-Polar and Non-polar dielectrics- Effect of electric field on dielectrics, Dielectric strength, Capacitance of a parallel plate condenser with dielectric slab between the plates, Electric displacement D, electric polarization P, Relation between D, E and P, Dielectric constant and electric susceptibility.

**UNIT-II**

**3. Magnetostatics: (6 hrs)**

Biot-Savart's law and its applications: (i) circular loop and (ii) solenoid, Divergence and curl of magnetic field, Ampere's Circuital Law and its application to Solenoid, Hall effect, determination of Hall coefficient and applications.

**4. Electromagnetic Induction: (6 hrs)**

Faraday's laws of electromagnetic induction, Lenz's law, Self induction and Mutual induction, Self inductance of a long solenoid, Mutual inductance of two coils, Energy stored in magnetic field, Eddy currents and Electromagnetic damping

**UNIT-III**

**5. Alternating currents: (6 hrs)**

Alternating current - Relation between current and voltage in LR and CR circuits, Phasor and Vector diagrams, LCR series and parallel resonant circuit, Q -factor, Power in ac circuits, Power factor.

**6. Electromagnetic waves-Maxwell's equations: (6hrs)**

Basic laws of electricity and magnetism-Idea of displacement current, Maxwell's equations-Derivation, Maxwell's wave equation (with derivation), Transverse nature of electromagnetic waves, Poynting theorem (Statement and proof)

**UNIT-IV**

**7. Basic Electronic devices: (12 hrs)**

PN junction diode, Zener diode and Light Emitting Diode (LED) and their I-V characteristics, Zener diode as a regulator- Transistors and its operation, CB, CE and CC configurations, Input and output characteristics of a transistor in CE mode, Relation between alpha, beta and gamma; Hybrid parameters, Determination of hybrid parameters from transistor characteristics; Transistor as an amplifier.

**UNIT-V**

**8. Digital Electronics: (12 hrs)**

Number systems, Conversion of binary to decimal system and vice versa, Binary addition & Binary subtraction (1's and 2's complement methods), Laws of Boolean algebra, DeMorgan's laws-Statements and Proofs, Basic logic gates, NAND and NOR as universal gates, Exclusive-OR gate, Half adder and Full adder circuits.

**REFERENCE BOOKS:**

- ❖ BSc Physics, Vol.3, Telugu Akademy, Hyderabad.
- ❖ Electricity and Magnetism, D.N. Vasudeva. S. Chand & Co.
- ❖ Electricity and Magnetism, B.D.Duggal and C.L.Chhabra. Shobanlal& Co.
- ❖ Electricity, Magnetism with Electronics, K.K.Tewari, R.Chand& Co.,
- ❖ Electricity and Magnetism, R.Murugesan, S. Chand & Co.
- ❖ Principles of Electronics, V.K. Mehta, S.Chand& Co.,
- ❖ Digital Principles and Applications, A.P. Malvino and D.P.Leach, McGrawHill Edition

**PRACTICAL COURSE IV: ELECTRICITY, MAGNETISM AND ELECTRONICS**

Work load: 30hrs]

[2 hrs/week

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**Minimum of 6 experiments to be done and recorded**

1. Figure of merit of a moving coil galvanometer.
2. LCR circuit series/parallel resonance, Q factor.
3. Determination of ac-frequency –Sonometer.
4. Verification of Kirchoff's laws and Maximum Power Transfer theorem.
5. Field along the axis of a circular coil carrying current-Stewart & Gee's apparatus.
6. PN Junction Diode Characteristics
7. Zener Diode –V-I Characteristics
8. Zener Diode as a voltage regulator
9. Transistor CE Characteristics- Determination of hybrid parameters
10. Logic Gates- OR,AND,NOT and NAND gates. Verification of Truth Tables.
11. Verification of De Morgan's Theorems.
12. Construction of Half adder and Full adders-Verification of truth tables

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**S S B N DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU**

**B.Sc. PHYSICS SYLLABUS UNDER CBCS**

**For Mathematics Combinations**

[2021-22 Batch onwards]

**II Year B.Sc.-Physics: IV Semester**

**Course-V: MODERN PHYSICS**

**Work load: 60 hrs per semester]**

**[4 hrs/week**

**UNIT-I**

**1. Atomic and Molecular Physics: (12 hrs)**

Vector atom model and Stern-Gerlach experiment, Quantum numbers associated with it, Angular momentum of the atom, Coupling schemes, Spectral terms and spectral notations, Selection rules, Intensity rules, Fine structure of Sodium D-lines, Zeeman effect, Experimental arrangement to study Zeeman effect; Raman effect, Characteristics of Raman effect, Experimental arrangement to study Raman effect, Quantum theory of Raman effect, Applications of Raman effect.

**UNIT-II**

**2. Matter waves & Uncertainty Principle: (12 hrs)**

Matter waves, de Broglie's hypothesis, Wave length of matter waves, Properties of matter waves, Davisson and Germer's experiment, Phase and group velocities, Heisenberg's uncertainty principle for position and momentum & energy and time, Illustration of uncertainty principle using diffraction of beam of electrons (Diffraction by a single slit) and photons (Gamma ray microscope), Bohr's principle of complementarity.

**UNIT-III**

**3. Quantum (Wave) Mechanics: (12 hrs)**

Basic postulates of quantum mechanics, Schrodinger time independent and time dependent wave equations-Derivations, Physical interpretation of wave function, Eigen functions, Eigen values, Application of Schrodinger wave equation to (i) one dimensional potential box of infinite height (Infinite Potential Well) and (ii) one dimensional harmonic oscillator

**UNIT-IV**

**4. Nuclear Physics: (12 hrs)**

*Nuclear Structure:* General Properties of Nuclei, Mass defect, Binding energy; *Nuclear forces:* Characteristics of nuclear forces- Yukawa's meson theory; *Nuclear Models:* Liquid drop model, The Shell model, Magic numbers; *Nuclear Radiation detectors:* G.M. Counter, Cloud chamber, Solid State detector; *Elementary Particles:* Elementary Particles and their classification

**UNIT-V**

**5. Nano materials: (7hrs)**

Nano materials – Introduction, Electron confinement, Size effect, Surface to volume ratio, Classification of nano materials– (0D, 1D, 2D); Quantum dots, Nano wires, Fullerene, CNT, Graphene (Mention of structures and properties), Distinct properties of nano materials (Mention-mechanical, optical, electrical, and magnetic properties); Mention of applications of nano materials: (*Fuel cells, Phosphors for HD TV, Next Generation Computer chips, elimination of pollutants, sensors*)

**6. Superconductivity: (5 hrs)**

Introduction to Superconductivity, Experimental results-critical temperature, critical magnetic field, Meissner effect, Isotope effect, Type I and Type II superconductors, BCS theory (elementary ideas only), Applications of superconductors

**REFERENCE BOOKS:**

- BSc Physics, Vol.4, Telugu Akademy, Hyderabad
- Atomic Physics by J.B. Rajam; S.Chand& Co.,
- Modern Physics by R. Murugesan and Kiruthiga Siva Prasath. S. Chand & Co.
- Concepts of Modern Physics by Arthur Beiser. Tata McGraw-Hill Edition.
- Nuclear Physics, D.C.Tayal, Himalaya Publishing House.
- S.K. Kulkarni, Nanotechnology: Principles & Practices (Capital Publ.Co.)
- K.K.Chattopadhyay&A.N.Banerjee, Introd.to Nanoscience and Technology (PHI LearningPriv.Limited).
- Nano materials, A K Bandopadhyay. New Age International Pvt Ltd (2007)
- Textbook of Nanoscience and Nanotechnology, BS Murthy, P Shankar, Baldev Raj, BB Rath and J Murday-Universities Press-IIM

**PRACTICAL COURSE-V: MODERN PHYSICS**

Work load: 30 hrs

2 hrs/week

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**Minimum of 6 experiments to be done and recorded**

1.  $e/m$  of an electron by Thomson method.
2. Determination of Planck's Constant (photocell).
3. Verification of inverse square law of light using photovoltaic cell.
4. Determination of the Planck's constant using LEDs of at least 4 different colours.
5. Determination of work function of material of filament of directly heated vacuum diode.
6. Study of absorption of  $\alpha$ -rays.
7. Study of absorption of  $\beta$ -rays.
8. Determination of Range of  $\beta$ -particles.
9. Determination of M & H.
10. Analysis of powder X-ray diffraction pattern to determine properties of crystals.
11. Energy gap of a semiconductor using junction diode.
12. Energy gap of a semiconductor using Thermistor
13. GM counter characteristics

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**S S B N DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU**

**Skill Development Course (SDC)**

**OFFERED BY DEPARTMENT OF PHYSICS**

[2021-22 Batch onwards]

**III Semester**

**SOLAR ENERGY**

**Total 30 hrs (02h/wk)]**

**[02 Credits & Max Marks: 50**

**UNIT-I – Solar Radiation: (10 hrs)**

Sun as a source of energy, Solar radiation, Solar radiation at the Earth's surface, Measurement of Solar radiation-Pyroheliometer, Pyranometer, Sunshine recorder, Prediction of available solar radiation, Solar energy-Importance, Storage of solar energy, Solar pond

**UNIT-II – Solar Thermal Systems: (10 hrs)**

Principle of conversion of solar radiation into heat, Collectors used for solar thermal conversion: Flat plate collectors and Concentrating collectors, Solar Thermal Power Plant, Solar cookers, Solar hot water systems, Solar dryers, Solar Distillation, Solar greenhouses.

**UNIT-III – Solar Photovoltaic Systems: (10 hrs)**

Conversion of Solar energy into Electricity - Photovoltaic Effect, Solar photovoltaic cell and its working principle, Different types of Solar cells, Series and parallel connections, Photovoltaic applications: Battery chargers, domestic lighting, street lighting and water pumping

**REFERENCE BOOKS:**

1. Solar Energy Utilization, G. D. Rai, Khanna Publishers
2. Solar Energy- Fundamentals, design, modeling & applications, G.N. Tiwari, Narosa Pub., 2005.
3. Solar Energy-Principles of thermal energy collection & storage, S.P. Sukhatme, Tata Mc-Graw Hill Publishers, 1999.
4. Solar Photovoltaics- Fundamentals, technologies and applications, Chetan Singh Solanki, PHI Learning Pvt. Ltd.,
5. Science and Technology of Photovoltaics, P. Jayarama Reddy, BS Publications, 2004.

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**S S B N DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU**

**Skill Development Course (SDC)**

**OFFERED BY DEPARTMENT OF PHYSICS**

[2021-22 Batch onwards]

**III Semester**

**APPLICATIONS OF PHYSICS IN DAILY LIFE**

**Total 30 hrs (02h/wk)]**

**[02 Credits & Max Marks: 50**

**UNIT-I**

**(10 hrs)**

Physics and its important - Inertia of rest - Examples of inertia of rest - Inertia of motion - Examples of inertia of motion - Role of inertia in avoiding accidents - Energy-Kinetic energy and potential energy – Energy of water stored in a overhead tank – Need of overhead tanks – Friction – Types of Friction – Advantages and disadvantages of friction in daily life – ways of minimization of friction

**UNIT-II**

**(10 hrs)**

Heat – Units of Heat – Temperature – units – Measurement of temperature-Clinical Thermometer-Sound-Limits of audibility-human ear- Defects of hearing and correction-Human eye-Defects of vision- Correction-Composition of white light-Colour of the objects- Primary colours- Mixing of primary colours (Secondary colours)- Colour filters

**UNIT-III**

**(10 hrs)**

Electric current-Alternating current and Direct current-Sources of current-Cell battery-Types of cells-Wiring system in houses- Types of wiring-writing accessories-switches-lamp holders-sockets-fuses-Electric shock-safety precautions-Role of insulators in avoiding electric shock-Calculation of current bill (KWH); Electric appliances-Electric bulbs-selection of low consumption bulbs-Electric bell-Electric heater

**REFERENCE BOOKS:**

1. Concepts of Physics I & II by H.C.verma, Bharathi Bhavan Publishers
2. Basics of Electricity by M.N. Anwani, Dhanpath rai & Co

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**S S B N DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU**

**B.Sc. PHYSICS SYLLABUS UNDER CBCS**

**For Mathematics Combinations**

[2020-21 Batch onwards]

**I Year B.Sc.-Physics: I Semester**

**Course I: MECHANICS, WAVES AND OSCILLATIONS**

**Work load: 60 hrs per semester]**

**[4 hrs/week**

**Course Outcomes (Theory) :**

On successful completion of this course, the students will be able to:

- Understand Newton's laws of motion and motion of variable mass system and its application to rocket motion and the concepts of impact parameter, scattering cross section.
- Apply the rotational kinematic relations, the principle and working of gyroscope and its applications and the precessional motion of a freely rotating symmetric top.
- Comprehend the general characteristics of central forces and the application of Kepler's laws to describe the motion of planets and satellite in circular orbit through the study of law of Gravitation.
- Understand postulates of Special theory of relativity and its consequences such as length contraction, time dilation, relativistic mass and mass-energy equivalence.
- Examine phenomena of simple harmonic motion and the distinction between undamped, damped and forced oscillations and the concepts of resonance and quality factor with reference to damped harmonic oscillator.
- Appreciate the formulation of the problem of coupled oscillations and solve them to obtain normal modes of oscillation and their frequencies in simple mechanical systems.
- Figure out the formation of harmonics and overtones in a stretched string and acquire the knowledge on Ultrasonic waves, their production and detection and their applications in different fields.

**Course Outcomes (Practicals) :**

On successful completion of this practical course, the student will be able to;

- Perform experiments on Properties of matter such as the determination of moduli of elasticity viz., Young's modulus, Rigidity modulus of certain materials; Surface tension of water , Coefficient of viscosity of a liquid , Moment of inertia of some regular bodies by different methods and compare the experimental values with the standard values.
- Know how to determine the acceleration due to gravity at a place using Compound pendulum and Simple pendulum.
- Notice the difference between flat resonance and sharp resonance in case of volume resonator and sonometer experiments respectively.
- Verify the laws of transverse vibrations in a stretched string using sonometer and comment on the relation between frequency, length and tension of a stretched string under vibration.
- Demonstrate the formation of stationary waves on a string in Melde's string experiment.
- Observe the motion of coupled oscillators and normal modes.

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**S S B N DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU**

**B.Sc. PHYSICS SYLLABUS UNDER CBCS**

**For Mathematics Combinations**

[2020-21 Batch onwards]

**I Year B.Sc.-Physics: II Semester**

**Course-II: WAVE OPTICS**

**Work load: 60 hrs per semester]**

**[4 hrs/week**

**Course Outcomes (Theory) :**

On successful completion of this course, the student will be able to:

- Understand the phenomenon of interference of light and its formation in (i) Lloyd's single mirror due to division of wave front and (ii) Thin films, Newton's rings and Michelson interferometer due to division of amplitude.
- Distinguish between Fresnel's diffraction and Fraunhofer diffraction and observe the diffraction patterns in the case of single slit and the diffraction grating.
- Describe the construction and working of zone plate and make the comparison of zone plate with convex lens.
- Explain the various methods of production of plane, circularly and polarized light and their detection and the concept of optical activity..
- Comprehend the basic principle of laser, the working of He-Ne laser and Ruby lasers and their applications in different fields.
- Explain about the different aberrations in lenses and discuss the methods of minimizing them.
- Understand the basic principles of fibre optic communication and explore the field of Holography and Nonlinear optics and their applications.

**Course Outcomes (Practicals) :**

On successful completion of this practical course the student will be able to:

- Gain hands-on experience of using various optical instruments like spectrometer, polarimeter and making finer measurements of wavelength of light using Newton Rings experiment, diffraction grating etc.
- Understand the principle of working of polarimeter and the measurement of specific rotatory power of sugar solution
- Know the techniques involved in measuring the resolving power of telescope and dispersive power of the material of the prism.
- Be familiar with the determination of refractive index of liquid by Boy's method and the determination of thickness of a thin wire by wedge method.

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**S S B N DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU**

**B.Sc. PHYSICS SYLLABUS UNDER CBCS**

**For Mathematics Combinations**

[2021-22 Batch onwards]

**II Year B.Sc.-Physics: III Semester**

**Course-III: HEAT AND THERMODYNAMICS**

**Work load: 60 hrs per semester]**

**[4 hrs/week**

**Course Outcomes (Theory) :**

On successful completion of this course, the student will be able to:

- Understand the basic aspects of kinetic theory of gases, Maxwell-Boltzman distribution law, equipartition of energies, mean free path of molecular collisions and the transport phenomenon in ideal gases
- Gain knowledge on the basic concepts of thermodynamics, the first and the second law of thermodynamics, the basic principles of refrigeration, the concept of entropy, the thermodynamic potentials and their physical interpretations.
- Understand the working of Carnot's ideal heat engine, Carnot cycle and its efficiency
- Develop critical understanding of concept of Thermodynamic potentials, the formulation of Maxwell's equations and its applications.
- Differentiate between principles and methods to produce low temperature and liquefy air and also understand the practical applications of substances at low temperatures.
- Examine the nature of black body radiations and the basic theories.

**Course Outcomes (Practicals) :**

On successful completion of this practical course, the student will be able to;

- Perform some basic experiments in thermal Physics, viz., determinations of Stefan's constant, coefficient of thermal conductivity, variation of thermo-emf of a thermo-couple with temperature difference at its two junctions, calibration of a thermocouple and Specific heat of a liquid.

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**S S B N DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU**

**B.Sc. PHYSICS SYLLABUS UNDER CBCS**

**For Mathematics Combinations**

[2021-22 Batch onwards]

**II Year B.Sc.-Physics: IV Semester**

**Course-IV: ELECTRICITY, MAGNETISM AND ELECTRONICS**

**Work load: 60 hrs per semester]**

**[4 hrs/week**

**Course Outcomes (Theory) :**

On successful completion of this course, the students will be able to:

- Understand the Gauss law and its application to obtain electric field in different cases and formulate the relationship between electric displacement vector, electric polarization, Susceptibility, Permittivity and Dielectric constant.
- Distinguish between the magnetic effect of electric current and electromagnetic induction and apply the related laws in appropriate circumstances.
- Understand Biot and Savart's law and Ampere's circuital law to describe and explain the generation of magnetic fields by electrical currents.
- Develop an understanding on the unification of electric and magnetic fields and Maxwell's equations governing electromagnetic waves.
- Phenomenon of resonance in LCR AC-circuits, sharpness of resonance, Q- factor, Power factor and the comparative study of series and parallel resonant circuits.
- Describe the operation of p-n junction diodes, zener diodes, light emitting diodes and transistors
- Understand the operation of basic logic gates and universal gates and their truth tables.

**Course Outcomes (Practicals) :**

On successful completion of this practical course the student will be able to:

- Measure the current sensitivity and figure of merit of a moving coil galvanometer.
- Observe the resonance condition in LCR series and parallel circuit
- Learn how a sonometer can be used to determine the frequency of AC-supply.
- Observe the variation of magnetic field along the axis of a circular coil carrying current using Stewart and Gee's apparatus.
- Understand the operation of PN junction diode, Zener diode and a transistor and their V-I characteristics.
- Construct the basic logic gates, half adder and full adder and verify their truth tables. Further, the student will understand how NAND and NOR gates can be used as universal building blocks.

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**S S B N DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU**

**B.Sc. PHYSICS SYLLABUS UNDER CBCS**

**For Mathematics Combinations**

[2021-22 Batch onwards]

**II Year B.Sc.-Physics: IV Semester**

**Course-V: MODERN PHYSICS**

**Work load: 60 hrs per semester]**

**[4 hrs/week**

**Course Outcomes (Theory) :**

On successful completion of this course, the students will be able to:

- Develop an understanding on the concepts of Atomic and Modern Physics, basic elementary quantum mechanics and nuclear physics.
- Develop critical understanding of concept of Matter waves and Uncertainty principle.
- Get familiarized with the principles of quantum mechanics and the formulation of Schrodinger wave equation and its applications.
- Examine the basic properties of nuclei, characteristics of Nuclear forces, salient features of Nuclear models and different nuclear radiation detectors.
- Classify Elementary particles based on their mass, charge, spin, half life and interaction.
- Get familiarized with the nano materials, their unique properties and applications.
- Increase the awareness and appreciation of superconductors and their practical applications.

**Course Outcomes (Practicals) :**

On successful completion of this practical course, the student will be able to;

- Measure charge of an electron and  $e/m$  value of an electron by Thomson method.
- Understand how the Planck's constant can be determined using Photocell and LEDs.
- Study the absorption of  $\alpha$ -rays and  $\beta$ -rays, Range of  $\beta$ -particles and the characteristics of GM counter
- Determine the Energy gap of a semiconductor using thermistor and junction diode.

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**SSBN DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU**

**Skill Development Course (SDC)**

**OFFERED BY DEPARTMENT OF PHYSICS**

[2021-22 Batch onwards]

**III Semester**

**SOLAR ENERGY**

**Total 30 hrs (02h/wk)]**

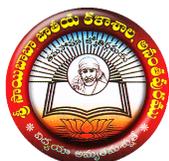
**[02 Credits & Max Marks: 50**

**Learning Outcomes:**

After successful completion of the course, students will be able to:

- Acquire knowledge on solar radiation principles with respect to solar energy estimation.
- Get familiarized with various collecting techniques of solar energy and its storage
- Learn the solar photovoltaic technology principles and different types of solar cells for energy conversion and different photovoltaic applications.
- Understand the working principles of several solar appliances like Solar cookers, Solar hot water systems, Solar dryers, Solar Distillation, Solar greenhouses

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**SSBN DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU**

**Skill Development Course (SDC)**

**OFFERED BY DEPARTMENT OF PHYSICS**

[2021-22 Batch onwards]

**III Semester**

**APPLICATIONS OF PHYSICS IN DAILY LIFE**

**Total 30 hrs (02h/wk)]**

**[02 Credits & Max Marks: 50**

**Learning Outcomes:**

By successful completion of the course, students will be able to:

- Develop an understanding on the concepts of Basic Physics.
- Understand the working principles of Heat and Thermodynamics.
- Develop an understanding on the concepts of different household domestic current applications.

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Department of Physics

SRI SAI BABA NATIONAL DEGREE COLLEGE :: ANANTAPUR

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➤ **Beyond Syllabus**

**Recommended Co-Curricular Activities:**

**Measurable**

- Assignments (in writing and doing forms on the aspects of outside the syllabus content. (*Shall be individual and challenging*))
- Student seminars (on topics of the syllabus and related aspects. (*Individual activity*))
- Quiz (on topics where the content can be compiled by smaller aspects and data (*Individuals or groups as teams*))
- Field studies (individual observations and recordings as per syllabus content and related areas (*Individual or team activity*))
- Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (*team activity*))

**General**

- ❖ Group Discussion
- ❖ Visit to Research Stations, Science Museum Centres to understand the basic principles of mechanics with live examples and related industries
- ❖ Visit to Satellite launching station at **Sri Harikota.**

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