SRI Y N COLLEGE, NARSAPUR

SYLLABUS

Courses Focusing on EMPLOYABILITY, ENTREPRENEURSHIP AND SKILL DEVELOPMENT

2022-2023

DEPARTMENT OF PHYSICS

SRI Y.N.COLLEGE (A)

NARSAPUR

SRI Y N COLLEGE (A)-NARSAPUR

BOARD OF STUDIES MEETING

SYLLABUS

2022-2023

DEPARTMENT OF PHYSICS

SRI Y N COLLEGE (A)

NARSAPUR

PHYSICS

ACADEMIC YEAR 2022-2023

60

Date: 03-09-2022 Time: 10 AM

Board of Studies meeting held on 03-09-2022 at 10 AM

DEPARTMENT OF PHYSICS
SRI Y N COLLEGE (A), NARSAPUR
LIST OF CHAIRMAN& MEMBERS
BOARD OF STUDIES 2022-2023

1. **LIST OF CHAIRMAN & MEMBERS:**

01. A.P.V.APPA RAO, HOD of Physics & CHAIRMAN
02. Dr. L MALLESWARA RAO, Lecturer in Physics & MEMBER
03. Sri. P Rama Krishna Rao, Lecturer in Physics & MEMBER
04. Sri. Ch. Sundar Singh, Lecturer in Physics & MEMBER
05. Smt P Rajeswari, Lecturer in Physics & MEMBER
06. Kum G Suvarchala Devi, Lecturer in Physics & MEMBER
07. Sri M.S.Ranganayakulu, Lecturer in Physics & MEMBER
08. Kum V Durga Sandhya, Lecturer in Physics & MEMBER
09. Sri A. Rajesh, Lecturer in Physics & MEMBER
10. Sri K Naveen Kumar, Lecturer in Physics & MEMBER
11. Sri M Shankar, Demonstrator in Physics & MEMBER

2. UNIVERSITY NOMINEE: **Dr. K. SRINIVASA RAO**, Lecturer-in-charge,
Physics Department, Govt. Degree College, Mandapeta
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3. SUBJECT EXPERTS:
1. **Sri S SRINIVASA RAO,** Department of Physics,
SVKP & Dr KS Raju Arts & Science College (A),
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2. **Dr. G.SRINIVASA RAO,** Department of Physics,
Sri A.S.N.M Govt. Degree College (A), Palakol,
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4. SCIENTIST:
Dr. G. CHINA SATYANARAYANA, Scientist & Associate Professor, K L University, Centre for Atmospheric Science, Green Fields, Vaddeswaram-522502, Guntur District. A.P.
Email: chinna.satyanarayana@gmail.com, Cell: 9492821151.

5. ALUMNUS:
Dr. VVS NAIDU, Department of Physics Swarnandhra College of Engineering, Narsapur-534275, W.G.Dt. A.P
Email: vvsnaidu66@gmail.com, Cell: 9704824001.

Members Present :

1) Dr. L. Malleswara Rao
- chairman.

3/9/22

2) Dr. K. Srinivasa Rao,
Govt. Degree college,
Mandapeta

3/9/2022

3) Sri S. Srinivasa Rao,
SVKP & Dr. K.S. Raju A&S college,
Penugonda.

3/9/2022

4) Dr. G. Srinivasa Rao,
A.S.N.M. GDC,
Palakol.

3/9/2022

5) Dr. G. China Satyanarayana
Scientist & Associate Professor,
K.L. University, Vaddeswaram,
Guntur.

6) Dr. V.V.S. Naidu,
Swarnandhra College of Engineering,
Narsapur.

7) Sri P. Ramakrishna Rao,
Sri YN College, Narsapur.

8) Sri Ch. Sundara Singh,
Sri YN college, Narsapur.

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9) Smt. P. Rajeswari,
Sri YN college, Narsapur. 3/9/22

10) Kum. G. Suvarchala Devi,
Sri YN College, Narsapur. 3/9/22

11) Sri M.S. Ranganayakulu,
Sri YN college, Narsapur. M.S.R.Nayakulu 3/9/22

12) Sri A. Rajesh,
Sri YN college, Narsapur. A. Rajesh 3/9/22

13) Sri K. Naveen kumar,
Sri YN college, Narsapur. K. Naveen kumar 3/9/22

4) Kum V. Durga Sandhya,
Sri YN college, Narsapur. V. Durga Sandhya 3/9/22

5) Sri M. Shankar,
Sri YN college, Narsapur. M. Shankar

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Date: 23-08-2022

NOTICE

All the Heads of the Departments are requested to go through the agenda for the Board of Studies meeting for the academic year 2022-2023 of your respective departments and see that they are discussed thoroughly and the respective resolutions are recorded in the minutes book of the respective departments.

AGENDA:

1. To prepare the syllabi and model question papers for the degree I, II and III years for the academic year 2022-23 by making appropriate modifications (above or equal to 20%) to the University syllabus.
2. To prepare the syllabi and model question papers for Add-on courses, Certificate courses for the academic year 2022-2023.
3. To prepare syllabus for Bridge course for the newly admitted students.
4. To prepare course outcomes, programme outcomes and programme specific outcomes for the degree I, II & III years for the academic year 2022-2023.
5. To discuss the modalities for conducting the Social Immersion Programme (Community Service Project) at the end of the 1st year degree, Internship/Project at the end of second year degree and Internship during V semester or VI semester for III year degree students.
6. To discuss the modalities and topics for conducting Seminars/Workshops.
7. To discuss the issue of online courses to be done by the students and staff.
8. To discuss the staff publications in the UGC recognised journals.
9. To discuss the issue of getting functional MOUs with the industry.
10. To discuss the feasibility of developing collaborations with other Colleges.
11. To evolve a plan of action for the Consultancy activity.
12. To discuss about ICT enabled teaching to the students.
13. Any other item with permission of the chair.

Ch. R. V. Ratna Prasad.
MEMBER SECRETARY

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For 2022-2023 Admitted Batch [2020-21 Admitted Batch onwards]

BOARD OF STUDIES MEETING

Resolutions:

1.
   a) It is resolved to adopt and implement new B.Sc., Physics syllabus as prescribed by APSCHE and Adikavi Nannaya University, Rajamahendravaram w.e.f 2020-21 and ratify the minutes of Department Board of Studies meeting held on 03-09-2022 in the Physics department.
   b) It is resolved to approve I B.Sc., Physics syllabus (Theory, Practical and Model Question paper), Semester-I, Paper-I i.e., "**Mechanics, Waves and Oscillations**" and Semester-II, Paper-II i.e., "**Wave Optics**" w.e.f. academic year 2020-21 as prescribed by the APSCHE and ANUR for the academic year 2022-2023 by making appropriate modifications (above or equal to 20%) to the University syllabus.
   c) It is resolved to approve II B.Sc., Physics syllabus (Theory, Practical and Model Question paper), Semester-III, Paper-III i.e., "**Heat and Thermodynamics**", and Semester-IV, Paper-IV i.e., "**Electricity, Magnetism and Electronics**", Paper-V "**Modern Physics**" w.e.f. academic year 2021-22 as prescribed by APSCHE and ANUR for the academic year 2022-2023 by making appropriate modifications (above or equal to 20%) to the University syllabus.
   d) It is also resolved that, under the Structure of Skill Enhancement Courses (SECs) for Semester –V, to choose one pair from the three alternative of SECs. In the V Semester, members of of BOS have chosen two papers. One paper, **Paper VI** "**Low temperature Physics & Refrigeration**" and the other, **Paper VII** "**Solar Energy and Applications**" w.e.f. academic year 2022-23 as prescribed by APSCHE and ANUR.
   e) It is resolved to approve III B.Sc., Physics syllabus (Theory, Practical and Model Question paper), Semester-V, Paper-VI i.e., "**Low temperature Physics & Refrigeration**", and Semester-V, Paper-VII i.e., "**Solar Energy and Applications**", w.e.f. academic year 2022-23 as prescribed by APSCHE and ANUR for the academic year 2022-2023 by making appropriate modifications (above or equal to 20%) to the University syllabus.
   f) It is resolved to continue the syllabus of "**Solar Energy**" the Skill Development Course (SDC) in the II Semester of all I B.Sc., courses w.e.f. the academic year 2020-21 for the academic year 2022-2023 by making appropriate modifications (above or equal to 20%) to the University syllabus.
2. It is resolved to approve I B.Sc., Semester-II Physics Certificate Course syllabus (Theory and Model Question paper), i.e., "**Refrigeration and Air conditioning**" w.e.f. 2014-2015 for the academic year 2022-2023.
3. It is resolved to approve the Bridge Course Syllabus for newly admitted Batch for the academic year 2022-2023
4. It is resolved to approve Course Outcomes (CO's), Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's) for the syllabi of degree I,II & III years for the academic year 2022-2023.
5. a) It is resolved through discussion, designed the procedure to be adopted for conducting the Social Immersion Programmme (Community Service Project) at the end of the I year degree for the academic years 2020-2021, 2021-2022 and 2022-2023 w.e.f 2020-2021, as per the guidelines given by APSCHE.

   b) It is resolved through discussion, designed the procedure to be adopted for conducting the Social Immersion Programmme i.e., Internship/Project at the end of the

II year degree for the academic year 2021-2022 w.e.f 2021-2022, as per the guidelines given by APSCHE.

c) It is resolved through discussion, designed the procedure to be adopted for conducting the Social Immersion Programmme i.e., Internship during V semester or VI semester for III year degree students at the end of V semester for the academic year 2022-2023 w.e.f 2022-2023, as per the guidelines given by APSCHE depending upon the choice of the student.

6. Discussed various topics for seminars/workshops and resolved to conduct a Seminar/workshop on **"Nanomaterials and its applications" or "Reneweable Energy Resources-Solar Energy".**
7. It is resolved that the online courses like MOOCS, SWAYAM and courses offered by Spoken tutorial should be done by the Staff and students.
8. Discussed regarding the staff publications. It is resolved that the staff members should make good effort to have their publications in the UGC Care List journals, Web of Science and Scopus Indexed Journals.
9. It is resolved to make functional MoU's with various industries and make field visits by sending the students to companies and also invite industry people to the college for giving awareness to the students on various aspects like skill enhancement and job opportunities etc.
10. The department of Physics has MOU/Collaborations with other colleges i.e., Deepthi Degree College, Mamidikuduru, a mentee college, SVKP & Dr K S Raju Arts & Science College (A), Sri DNR Govt. Degree College, Palakol and ASNM Govt Degree College (A), Palakol. It is resolved to deliver guest lecturers/Student seminars/Student Exchange programs to the students of Deepthi Degree College, Mamidikuduru, SVKP & Dr K S Raju Arts & Science College (A), Sri DNR Govt. Degree College, Palakol and ASNM Govt Degree College(A), Palakol by the faculty members of Physics.
11. The College has entered into the Academic Collaboration with Sir C. R. Reddy College (A), Eluru on 27-10-2021. Hence, it is resolved to organize Guest lectures/ Student Seminars/Student Exchange Programs. It resolved to evolve a plan of action for the consultancy activity by approaching the business organizations in the district.
12. It is resolved use ICT enabled Tools for effective teaching to the students.
13. It is resolved to authorize the Chairman, Board of Studies to strengthen the syllabus and model papers of theory and practical examinations keeping in view the latest developments in consultation with other members of the department. Any further guidelines/instructions from APSCHE/ University are to be adopted as communicated.

Signatures

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2) 3/9/2022.

3) 3/9/22

4) 3/9/2021

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SRI Y. N. COLLEGE (AUTONOMOUS) NAAC ACCREDITED 'A' GRADE COLLEGE DEPARTMENT OF PHYSICS NARSAPUR - 534 275, W.G. Dt.

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B.Sc
PHYSICS

DETAILS OF COURSE TITLES & CREDITS

Note: *Course type code: T: Theory, L: Lab, P: Problem solving

Sem	Course no.	Course Name	Course type (T/L/P)	Hrs./Week (Science: 4+2)	Credits (Science: 4+1)	Max. Marks Cont/ Internal/Mid Assessment	Max. Marks Sem-end Exam
I	1	Mechanics, Waves & Oscillations	T	4	4	25M	75M
	2	Practicle course -1	L	2	1	0	50M
II	3	Wave Optics	T	4	4	25M	75M
	4	Practical Course - 2	L	2	1	0	50M
III	5	Heat & Thermodynamic	T	4	4	25M	50M
	6	Practical Course - 3	L	2	1	0	50M
IV	7	Electricity, Magnetism &Electronics	T	4	4	25M	50M
	8	Practical Course - 4	L	2	1	0	50M
	9	Modern Physics	T	4	4	25M	50M
	10	Practical Course -5	L	2	1	0	25M
V	6	Low Temperature Physics & Refrigeration	T	4	4	25M	50M
		Low Temperature Physics & Refrigeration Lab	L	2	1	0	25M
	7	Solar Energy and Applications	T	4	4	25M	50M
		Solar Energy and Applications Lab	L	2	1	0	25M

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4) 3/9/2022

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3/9/22

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SEMESTER – I PAPER – I
I B.Sc.: PHYSICS SYLLABUS UNDER CBCS
MECHANICS, WAVES AND OSCILLATIONS

UNIT-I:

1. Mechanics of Particles: (05 hrs)

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

2. Mechanics of Rigid bodies: (07 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 atom and nucleus in magnetic field**, 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.**

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

6. Complex vibrations: (05 hrs)

Fourier theorem and evaluation of the Fourier coefficients, analysis of periodic wave functions-square wave.

Unit-V:

7. Vibrating Strings: (07 hrs)

Transverse wave propagation along a stretched string, General solution of wave equation and its significance, Modes of vibration of stretched string clamped at ends, Overtones and Harmonics, **Melde's strings**.

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

(NOTE: 1. Topics in Bold letters are added topics.
2. Problems should be solved at the end of every chapter of all units)

REFERENCE BOOKS:

- B. Sc. Physics, Vol.1, Telugu Academy, Hyderabad
- Fundamentals of Physics Vol. I - Resnick, Halliday, Krane ,Wiley India 2007
- College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House.
- University Physics-FW Sears, MW Zemansky& HD Young,Narosa Publications, Delhi
- Mechanics, S.G.Venkatachalapathy, Margham Publication, 2003.
- Waves and Oscillations. N. Subramanyam and Brijlal, VikasPulications.
- Unified Physics - Waves and Oscillations, Jai PrakashNath&Co.Ltd.
- Waves & Oscillations. S.Badami, V. Balasubramanian and K.R. Reddy, Orient Longman.
- The Physics of Waves and Oscillations, N.K.Bajaj, Tata McGraw Hill
- Science and Technology of Ultrasonics- Baldevraj, Narosa, New Delhi,2004

BLUE PRINT
SEMESTER – 1 PAPER I
MECHANICS, WAVES AND OSCILLATIONS

Chapter / Unit	Section A (5 marks)	Section – B (10 marks)	Section – C (10 marks)
UNIT-I: **1. Mechanics of Particles**	1	1	
2. Mechanics of Rigid bodies	1 (Problem)		1
Unit-II: **3. Motion in a Central Force Field**	1	1	1
UNIT-III: **4. Relativistic Mechanics**	1 (Problem)	1	1
Unit-IV: **5. Undamped, Damped and Forced oscillations**	1	1	
6. Complex vibrations	1		1
Unit-V: **7. Vibrating Strings**	1	1	
8. Ultrasonics	1 (Problem)		1

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4) 3/9/2022

5)

3/9/22

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SEMESTER – I PAPER – I
I B.Sc.: PHYSICS MODEL QUESTION PAPER
MECHANICS, WAVES AND OSCILLATIONS

Time: 3 Hrs. Max. Marks: 75M

SECTION – A

Answer any **FIVE** questions. 5 x 5 = 25 M

01. Explain the Motion of a system of variable mass.
చరద్రవ్యరాశి వ్యవస్థను వివరింపుము.

02. Prove conservative force as a negative gradient of potential energy?
నిత్యత్వ బలం, స్థితిజ శక్తి యొక్క ఋణ ప్రవణత అని చూపుము.

03. Write the differential equation and solution of simple harmonic oscillator?
సరళ హరాత్మక డోలకం యొక్క అవకలన సమీకరణం రాబట్టి పరిష్కారాన్ని వ్రాయుము.

04. State Fourier Theorem. What are its limitations?
ఫురియో సిద్ధాంతాన్ని నిర్వచించుము. దాని అవధులను పేర్కొనుము.

05. Explain laws of transverse vibrations of strings and overtones.
తీగలలో తిర్యక్ కంపన నియమాలను మరియు అతిస్వరాలను వివరించుము.

06. A sphere of mass 2.5 kg and diameter 1 m rolls without slipping with a constant velocity of 2 m/sec. Calculate its total energy.
2.5 కెజి ద్రవ్యరాశి కలిగి 1 మీ వ్యాసం ఉన్న గోళం ఒకటి జారకుండా దొర్లుతూ ఒక క్షితిజ సమాంతర రోడ్డుపై 2 m/sec వేగంతో ప్రయాణిస్తోంది. దాని మొత్తం శక్తి ఎంత.

07. A Clock showing correct time when at rest, loses one hour in a day when it in moving. What is its velocity?
ఒక గడియారం విరామస్థితిలో ఉన్నప్పుడు సక్రమమయిన కాలాన్ని చూపిస్తోంది. ఆ గడియారం చలిస్తూ ఉన్నప్పుడు రోజులో ఒక గంట నష్టపోతే, దాని వేగం ఎంత?

08. Thickness of a Piezo electric crystal is 0.002 m. Velocity of sound wave in the crystal is 5750 m/sec. Calculate its fundamental frequency?
పీజో విద్యుత్ క్వార్ట్జ్ స్ఫటిక మందం 0.002 m. ఆ స్ఫటికములో ధ్వని తరంగ వేగం 5750 m/sec. దాని ప్రాథమిక పౌనఃపున్యమును గణించండి.

Answer any **FIVE** questions from sections B and C choosing atleast **TWO** questions from each section. Each question carries 10 marks. **5 x 10 = 50 M**

SECTION –B

09. Define impact parameter and scattering cross section. Obtain the equation for the angle of scattering of α particle in Rutherford scattering.
అభిఘాత పరామితి మరియు పరిక్షేపణ మధ్య చ్ఛేదములను నిర్వచించుము. రూధర్ ఫర్డ్ పరిక్షేపణలో α కణ పరిక్షేపణ కోణానికి సమీకరణం ఉత్పాదించుము.

10. Define central force. Give three examples. Obtain the equation of motion of a body under central forces.
కేంద్రీయ బలం అంటే ఏమిటి? మూడు ఉదాహరణ లిమ్ము, ఒక వస్తువు పై కేంద్రీయ బలం పని చేస్తున్నప్పుడు గమన సమీకరణాన్ని ఉత్పాదించండి.

11. Describe Michelson–Morley Experiment and discuss the negative result.
మైకల్సన్ - మెర్లే ప్రయోగమును వర్ణించి, దాని ఋణ ఫలితమును చర్చించుము.

12. What are damped oscillations? Derive the equation of motion of damped oscillator and find its solution?
అవరుద్ధ డోలనాలు అనగానేమి? అవరుద్ధ డోలకం యొక్క గమనానికి సమీకరణం రాబట్టుము మరియు దాని పరిష్కారాన్ని కనుగొనుము.

13. Obtain the equation for the velocity of transverse wave in a stretched string and discuss the solution of the wave equation.
సాగదీసిన తీగలో ప్రసారమయ్యే తిర్యక్ తరంగానికి సమీకరణాన్ని రాబట్టి, దాని పరిష్కారాన్ని చర్చించండి.

SECTION – C

14. Derive the Euler's equations of rotational motion for a rigid body fixed at one end and prove to law of conservation of energy using Euler's equations.
ధృడమైన పరిభ్రమణములో ఉన్న వ్యవస్థకు యూలర్ సమీకరణాలను రాబట్టి, వాటిని ఉపయోగించి శక్తి నిత్యత్వ నియమమును రాబట్టుము.

15. State Kepler's laws of planetary motion. Prove First law of planetary motion.
కెప్లర్ గ్రహ గమన నియమాలను తెలిపి, మొదటి నియమాన్ని ఋజువు చేయండి.

16. State postulates of special theory of relativity and deduce Lorentz transformation equation.
ప్రత్యేక సాపేక్ష సిద్ధాంతపు ప్రతిపాదనలు తెల్పండి. లారెంట్జ్ రూపాంతరీకరణ సమీకరణాన్ని రాబట్టండి.

17. Using Fourier theorem, analyze a 'Square Wave'.
ఫురియో సిద్ధాంతాన్ని ఉపయోగించి చతురస్ర తరంగాన్ని విశ్లేషించుము.

18. What are Ultrasonics? Describe the Piezo electric method of producing Ultrasonic waves?
అతిధ్వనులు అనగా నేమి? పీడన విద్యుత్ ఫలిత పద్ధతిని అతిధ్వనులను ఉత్పాదించుట వివరించుము?

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SEMESTER – II PAPER – II

I B.Sc.: PHYSICS SYLLABUS UNDER CBCS

WAVE OPTICS

UNIT-I:

Interference of light: **(12hrs)**

Introduction, Conditions for interference of light, Interference of light by division of wave front and amplitude, Interference in thin films: Plane parallel and 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 Fraunhoffer diffractions, Distinction between Fresnel and Fraunhoffer diffraction, Fraunhoffer diffraction at a single slit. Determination of wavelength of light using diffraction grating, Resolving power of grating, Fresnel's half period zones, Zone plate, comparison of zone plate with convex lens.

UNIT-III:

Polarisation of light: **(12hrs)**

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

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-He-Ne laser, Ruby laser, Applications of lasers;

Holography: Basic principle of holography, Applications of holography.

(NOTE: 1. Topics in Bold letters are added topics.

2. Problems should be solved at the end of every chapter of all units)

REFERENCE BOOKS:

- BSc Physics, Vol.2, Telugu Akademy, Hyderabad
- A Text Book of Optics-N Subramanyam, L Brijlal, S.Chand& Co.
- Optics-Murugeshan, S.Chand& Co.
- Unified Physics Vol.II Optics, Jai Prakash Nath &Co. Ltd., Meerut
- Optics,F.A. Jenkins and H.G.White, McGraw-Hill
- Optics, Ajoy Ghatak,TataMcGraw-Hill.
- Introduction of Lasers – Avadhanulu, S.Chand& Co.
- Principles of Optics- BK Mathur, Gopala Printing Press, 1995

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SEMESTER – II PAPER II
WAVE OPTICS

Chapter / Unit	Section A (5 marks)	Section – B (10 marks)	Section – C (10 marks)
UNIT-I: Interference of light	1+1 (Problem)	1	1
Unit-II: Diffraction of light:	1+1 (Problem)	1	1
UNIT-III: Polarisation of light	1+1 (Problem)	1	1
Unit-IV: Aberrations and Fibre Optics	1	1	1
Unit-V: Lasers and Holography	1	1	1

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SEMESTER – II PAPER – II
I B.Sc.: PHYSICS MODEL QUESTION PAPER
WAVE OPTICS

Time: 3 Hrs. Max. Marks: 75M

SECTION – A

Answer any **FIVE** questions. 5 x 5 = 25 M

1. Explain the formation of colors in thin films.
   పలుచని పొరలలో రంగులు ఏర్పడు విధమును వివరించుము.
2. Write any five differences between Fresnel and Fraunhoffer diffraction.
   ఫ్రెనెల్ మరియు ఫ్రాన్ హోఫర్ వివర్తనముల మధ్య ఏవేని 5 బేధములు వ్రాయుము.
3. State and explain Malus law.
   మాలస్ సూత్రమును నిర్వచించి వివరించుము.
4. Explain Spherical aberration. Write any one method to minimize it.
   గోళీయ విపథనమును వివరించుము. దానిని నివారించడానికి ఏదైనా ఒక పద్ధతిని వ్రాయుము.
5. Explain about the principle of LASER
   లేసర్ సూత్రమును వివరించుము.
6. In a Newton's rings experiment, the diameter of 5th ring was 0.3cm and the diameter of 25th ring was 0.8cm. If the radius of curvature of the Plano convex lens is 100cm, find the wave length of light used.
   న్యూటన్ వలయాల ప్రయోగములో 5వ వలయము యొక్క వ్యాసము 0.3 సెం.మీ. మరియు 25వ వలయము యొక్క వ్యాసము 0.8 సెం.మీ. ఉపయోగించిన సమతల కుంభాకార కటము యొక్క వక్రతా వ్యాసార్ధము 100 సెం.మీ. అయితే, కాంతి తరంగదైర్ఘ్యము కనుగొనుము.
7. Find the radius of first zone in a zone plate of focal length 20cm. for a light of wave length 5000A^{o}.
   20సెం.మీ. నాభ్యంతరము గల మండల ఫలకము పై 5000A^{o} తరంగదైర్ఘ్యము గల కాంతి పతనమైనపుడు మొదటి మండలము యొక్క వ్యాసార్ధము కనుగొనుము.
8. Calculate the minimum thickness of quarter wave plate made of quartz to be used for a light of wavelength 600nm. Given that $\mu_0 = 1.544$ & $\mu_e = 1.533$.
   600nm తరంగ దైర్ఘ్యము గల కాంతికి ఉపయోగించడానికి క్వార్ట్జ్ తో చేయబడిన చతుర్థాంశ తరంగ ఫలకము యొక్క కనీస మందము విలువను కనుగొనుము. $\mu_0 = 1.544$ మరియు $\mu_e = 1.533$గా తీసుకొనుము.

Answer any FIVE questions from sections B and C choosing atleast TWO questions from each section. Each question carries 10 marks. **5 x 10 = 50M**

SECTION – B

09. Explain interference by division of amplitude due to oblique incidence of a plane wave on a thin film due to reflected light.
పలుచని పారదర్శక పొర పై ఒక సమతల తరంగము ఏటవాలుగా పతనమైనపుడు పరావర్తన కాంతిలో కంపన పరిమితి విభజన ద్వారా జరిగే వ్యతికరణాన్ని వివరించుము.

10. Explain Fraunhofer diffraction due to single slit with necessary theory.
ఏక చీలికలపై అబిలంబ పతనములో ఫ్రాన్ హోఫర్ వివర్తనమును తగు సిద్ధాంతము తో వివరించుము.

11. Describe the construction and working of a Nicol prism.
నికల్ పట్టకము యొక్క నిర్మాణము మరియు పనిచేయు విధానమును వివరించుము.

12. Derive the conditions for achromatism when two lenses are (1) in contact and (2) separated by a distance.
రెండు కటకములు (1) ఒకదానితో ఒకటి తాకుతూ ఉన్నప్పుడు (2) కొంతదూరములో వేరుచేయబడి ఉన్నప్పుడు అవర్ణతకు షరతులు రాబట్టుము.

13. Explain the construction and working of Helium-Neon gas laser.
హీలియం-నియాన్ వాయు లేసర్ నిర్మాణము మరియు పనిచేయు విధానము వివరించుము.

SECTION – C

14. Describe the construction and working of Michelson's Interferometer. How can you Determine the wavelength of mono-chromatic light.
మైఖెల్సన్ వ్యతికరణ మాపకము నిర్మాణము మరియు పనిచేయు విధానములను వర్ణించుము.

15. Explain how a zone plate is constructed. Obtain the formula for the focal length of zone plate.
మండలఫలకమును నిర్మించు విధానమును వివరించుము. దాని నాభ్యంతరమునకు సూత్రమును రాబట్టుము.

16. Explain about the determination of Specific rotation by Laurent's half shade polarimeter.
లారెంట్ అర్ధ చాయా పరికరము సహాయం తో విశిష్ట భ్రమణ సామర్థ్యము కనుగొను విధానమును వివరించుము.

17. Write the construction of an Optical Fiber. Explain the principles of fiber optic communication.
ధృశా తంతువు నిర్మాణమును వివరించుము. ధృశా తంతు సమాచారము యొక్క నియమములను వివరించుము.

18. Write the basic principle of Holography. Write any five applications of Holography.
హోలొగ్రఫీ యొక్క ప్రాథమిక నియమమును తెలుపుము. హోలోగ్రఫి యొక్క ఏవేని ఐదు అనువర్తనాలను వ్రాయుము.

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SEMESTER – III PAPER – III

II B.Sc.: PHYSICS SYLLABUS UNDER CBCS

HEAT AND THERMODYNAMICS

UNIT-I: 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: 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, 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: 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 CP-CV (iii) Value of CP/CV (iv) Joule-Kelvin coefficient for ideal and Van der Waals' gases

UNIT-IV: 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 Helium by Kapitza's method, Production of low temperatures by adiabatic demagnetization (qualitative), Principle of refrigeration, Vapour Compression method, Practical applications of substances at low temperatures.

UNIT-V: 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.

(NOTE: 1. Topics in Bold letters are added topics.

2. Problems should be solved at the end of every chapter of all units)

REFERENCE BOOKS:

- BSc 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
- Heat and Thermodynamics- MS Yadav, Anmol Publications Pvt. Ltd, 2000
- University Physics, HD Young, MW Zemansky,FW Sears, Narosa Publishers, New Delhi

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SEMESTER – 1 PAPER I
HEAT AND THERMODYNAMICS

Chapter / Unit	Section A (5 marks)	Section – B (10 marks)	Section – C (10 marks)
UNIT-I **1. Kinetic Theory of gases**	1	1	1
Unit-II **2. Thermodynamics:**	1+1 (Problem)	1	1
UNIT-III **3. Thermodynamic Potentials and Maxwell's equations**	1	1	1
Unit-IV **4. Low temperature Physics**	1+1 (Problem)	1	1
Unit-V **5. Quantum theory of radiation**	1+1 (Problem)	1	1

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II B.Sc DEGREE EXAMINATIONS
PHYSICS MODEL QUESTION PAPER
For 2022-2023 Batch (w.e.f. 2020-2021)
SEMESTER III PAPER – III
HEAT & THERMODYNAMICS

Time: 3 Hrs. Max. Marks: 75M

SECTION – A

Answer any FIVE questions. **5 x 5 = 25 M**

1. Derive an expression for the diffusion of a gas on the basis of Kinetic theory.
   అణుచలన సిద్ధాంతము ఆధారముగా వాయు విసరణకు సమీకరణము ఉత్పాదించుము.
2. A reversible engine works between two temperatures whose difference is 100^0 C. If it absorbs 746 J of heat from the source and gives 546 J of heat to the sink, then calculate the temperatures of source and sink.
   ఒక ద్విగత యంత్రము 100^0 C బేధము గల రెండు ఉష్ణోగ్రతల మధ్య పని చేస్తున్నది. ఆ యంత్రము ఉష్ణాశయము నుండి 746J ఉష్ణాన్ని గ్రహించి, సింకుకు 546J ఉష్ణాన్ని విసర్జిస్తున్నది. అయిన ఉష్ణాశయము మరియు సింకుల ఉష్ణోగ్రతలు ఎంత?
3. Explain the physical significance of Entropy.
   ఎంట్రోపీ యొక్క భౌతిక భావనను వివరించుము.
4. Derive Clausius – Clayperon equation.
   క్లాసియస్ - క్లాపరాన్ సమీకరణమును ఉత్పాదించుము
5. Write any five differences between Joule Thomson and adiabatic expansions.
   జౌల్ థామ్సన్ మరియు స్థిరోష్ణక వ్యాకోచముల మధ్య ఏవేని 5 బేధములు వ్రాయుము
6. Calculate the Inversion temperature of Helium gas. Given a = $3.44\text{x}10^{-3}$ newton-m^4 / mol^2, b=$0.0237\text{x}10^{-3}$ m^3 / mol and R=8.31 joule /(mol-k)
   హీలియం వాయువు యొక్క విలోమన ఉష్ణోగ్రతను కనుగొనుము. a = $3.44\text{x}10^{-3}$ newton-m^4/mol^2, b=$0.0237\text{x}10^{-3}$ m^3/mol మరియు R=8.31joul/(mol-k)
7. Describe Ferry's black body.
   ఫెర్రీ కృష్ణ వస్తువును వర్ణించుము.
8. Calculate the temperature of the Sun from the following data. Solar constant S=1340 W/m^2 ; radius of the Sun R = $7.92\text{x}10^8$ m; Distance of the Sun from the earth r = $1.5 \text{ x } 10^{11}$ m and Stefan constant $\sigma = 5.7\text{x}10^{-8}$ $Wm^{-2} K^{-4}$.
   ఇచ్చిన దత్తాంశమును ఉపయోగించి సూర్యుడు ఉష్ణోగ్రతను కనుగొనుము. సౌర స్థిరాంకము S=1340 W/m^2 , సూర్యుని వ్యాసార్ధము R = $7.92\text{x}10^8$ m; భూమి నుండి సూర్యుని వరకు గల దూరము r = $1.5 \text{ x } 10^{11}$ m మరియు స్టీఫాన్ స్థిరాంకము $\sigma = 5.7 \text{ x } 10^{-8}$ $Wm^{-2} K^{-4}$.

Answer any FIVE questions from sections B and C choosing atleast TWO questions from each section. Each question carries 10 marks. **5 x 10 = 50M**

SECTION -- B

9. Derive an expression for Maxwell's law of distribution of molecular speeds in a gas.
వాయువులలో అణువులు ఏ విధంగా వితరణ చెంది ఉంటాయో తెలిపే మేక్స్ వెల్ అణువేగ వితరణ సమీకరణాన్ని ఉత్పాదించుము.

10. State and prove Carnot's theorem.
కార్నో సిద్ధాంతమును నిర్వచించి నిరూపించుము.

11. Derive Maxwell's Thermodynamic equations from thermodynamic potentials.
ఉష్ణగతిక శక్మాలనుండి మాక్స్ వెల్ ఉష్ణగతిక సమీకరణాలను రాబట్టుము.

12. Derive an expression for Joule Thomson Cooling.
జౌల్ థామ్సన్ శీతలీకరణానికి సమీకరణమును ఉత్పాదించుము.

13. Derive Wein's displacement law.
వీన్ స్థాన భ్రంశ నియమమును ఉత్పాదించుము.

SECTION – C

14. Derive an expression for the Viscosity of a gas on the basis of kinetic theory of gases.
వాయు అణుచలన సిద్ధాంతము ఆధారముగా వాయువు యొక్క స్నిగ్ధతకు సమీకరణము రాబట్టుము.

15. Describe T-S diagram for Carnot's cycle. Derive an expression for the efficiency of Carnot's engine from the T-S diagram
కార్నోచక్రానికి T-S పఠమును వర్ణించుము. దాని నుండి కార్నో యంత్రము యొక్క దక్షతకు సమీకరణమును ఉత్పాదించుము.

16. Derive the equations for (1) the difference and (2) ratio of the two specific heats of a perfect gas using Maxwell's thermodynamic equations.
మాక్స్ వెల్ ఉష్ణగతిక సమీకరణాలనుపయోగించి ఆదర్శ వాయువు యొక్క రెండు విశిష్టోష్ణాల మధ్య (1) బేధము మరియు (2) నిష్పత్తిలకు సూత్రాలను రాబట్టుము.

17. Explain Kapitza's method for liquefaction of helium gas with a neat diagram.
హీలియం వాయువును ద్రవీకరించడానికి కాపిట్జా పద్ధతిని చక్కటి పఠ సహాయమున వివరించుము.

18. Describe the construction and working of Disappearing filament Optical pyrometer.
అదృశ్యమయ్యే తీగ గల దృశా పైరోమీటరు నిర్మాణము మరియు పనిచేయు విధానము వర్ణించుము.

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SEMESTER – IV PAPER – IV

II B.Sc.: PHYSICS SYLLABUS UNDER CBCS

ELECTRICITY, MAGNETISM AND ELECTRONICS

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: (6 hrs)

Idea of displacement current, Maxwell's equations-Derivation, Maxwell's wave equation (with derivation), Transverse nature of electromagnetic waves, Poynting theorem (Statement only)

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..

(NOTE: 1. Topics in Bold letters are added topics.
2. Problems should be solved at the end of every chapter of all units)

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.Murugeshan, 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.

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SEMESTER – 1V PAPER IV
ELECTRICITY, MAGNETISM AND ELECTRONICS

Chapter / Unit	Section A (5 marks)	Section – B (10 marks)	Section – C (10 marks)
UNIT-I: **1. Electrostatics:** **2.Dielectrics:**	1	1	1
Unit-II: **3.Magnetostatics:** **4.Electromagnetic Induction:**	1 (Problem) 1	1	1
UNIT-III: **5.Alternating currents:** **6.Electromagnetic waves-Maxwell's equations:**	1	1	1
Unit-IV: **7. Basic Electronic devices:**	1+1 (Problem)	1	1
Unit-V: **8. Digital Electronics:**	1+1 (Problem)	1	1

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II B.Sc DEGREE EXAMINATIONS

PHYSICS MODEL QUESTION PAPER

For 2022-2023 Batch (w.e.f. 2020-21)

SEMESTER IV PAPER – IV

ELECTRICITY, MAGNETISM AND ELECTRONICS

TIME: 3Hrs **Max. Marks: 75**

SECTION-A

Answer any FIVE questions **5x5=25M**

1. Derive an expression for the potential due to a point charge.
   ఒక బిందు ఆవేశము వలన ఏర్పడిన పొటన్షియల్ కు సమీకరణం రాబట్టుము.
2. Explain Hall Effect.
   హాల్ ప్రభావము వివరించుము.
3. A solenoid of length 0.50 m wound with 5000 turns / m of wire has a radius 4 cm. Calculate the self inductance of solenoid.
   4 సెం.మీ. వ్యాసార్ధము, 0.50 మీటర్ల పొడవు గల సోలినాయిడ్ పై 5000 టర్న్స్ /మీ చుట్లు చుట్టబడి ఉంటే సోలినాయిడ్ యొక్క స్వయం ప్రేరణ గుణకం కనుగొనుము.
4. Show that electromagnetic waves are transverse in nature.
   ప్రకృతి లో విద్యుతయస్కంత తరంగాలు, తిర్యక్ తరంగాలని చూపుము.
5. Write a short note on Zener diode.
   జేనేర్ డయోడ్ పై లఘు టీక వ్రాయండి.
6. In a transistor base current and emitter current are 0.08 m A and 9.6 m A calculate collector current α and β.
   ట్రాన్సిస్టర్ ఆధార, ఉద్గార ప్రవాహములు వరుసగా 0.08 m A and 9.6 m A అయితే సేకరణి ప్రవాహమునకు α మరియు β కనుగొనుము.
7. State and explain De Morgan's theorem.
   డిమోర్గాన్ సిద్ధాంతమును వివరించుము
8. Using 2's complimental subtract $(100111)_2$ from $(110011)_2$
   రెండ్ల పూరక పద్ధతిని ఉపయోగించి $(110011)_2$ నుండి $(100111)_2$ తీసివేయుము

Answer any FIVE questions from sections B and C choosing atleast TWO questions from each section. Each question carries 10 marks. **5 x 10 = 50 M**

SECTION-B

9. State and prove Gauss law in electro statics
   స్థిర విద్యుత్ లో గాస్ నియమాన్ని నిర్వచించి నిరూపించుము.

10. Explain Biot-Savart's law. Derive an expression for the magnetic induction due to a circular loop carrying current.
బయట్ – సవరాట్ సూత్రమును వివరింపుము. విద్యుత్ ప్రవాహము గల ఒక వృత్తాకార తీగ చుట్ట లేదా లూప్ వలన అయస్కాంత ప్రేరణ సమీకరనమును రాభాట్టుము.

11. Given the detailed theory of L-C-R series circuit carrying AC and explain resonance condition.
ఏకంతర విద్యుత్ ప్రవహిస్తున్న L-C-R శ్రేణి వలయము యొక్క సిద్ధాంతాన్ని వ్రాయండి మరియు అనునాద నిభంధనలను వివరించండి

12. What is a P-N junction diode? Explain forward and reverse bias.
P – N సంధి డయోడ్ అనగానేమి ? పురోశక్మము , తిరోశక్మము లను వివరించుము.

13. 24. Discuss the working of a half adder and a full adder with their circuits with truth tables.
అర్ధ సంకలని మరియు పూర్ణ సంకలని వలయాలు , సత్య పట్టికలు వ్రాసి పని చేయు విధానమును చర్చించుము.

SECTION-C

14. Define electric displacement (D), electric polarization (P) & electric intensity (E) and obtain the relation among them.
విద్యుత్ స్థానభ్రంశము (D), విద్యుత్ క్షేత్ర తీవ్రత (E) మరియు విద్యుత్ ధ్రువములను నిర్వచించి, వాటి మధ్య సంబంధము రాభాట్టుము.

15. Define self induction. Obtain an expression for the self inductance of a long solenoid.
స్వయం ప్రేరణ నిర్వచించుము. ఒక పొడవయిన సోలినాయిడ్ స్వయం ప్రేరకత్వమునకు సమాసము ఉత్పాదించుము.

16. Write Maxwell's equation in differential and integral form. Derive Maxwell's wave equation.
మాక్స్ వెల్ సమీకరణము యొక్క అవకలన రూపాలు మరియు సమకలన రూపాలు వ్రాయండి.
విద్యుదయస్కాంత తరంగాల మాక్స్ వెల్ తరంగ సమీకరణము రాభాట్టుము.

17. Explain briefly the three possible transistors CB, CE & CC transistor connections.
CB, CE మరియు CC ట్రాన్సిస్ టర్లు మూడు అవకాశ సంధాలను క్లుప్తంగా వివరింపుము.

18. Write the operation of NAND and NOR gates. Give logic symbols and truth tables. Realize AND, OR and NOT gates from NAND gates.
NAND, మరియు NOR ద్వారముల పనిచేయు విధానము వ్రాయుము. వాటి తర్క చిహ్నములను యదార్ద పట్టికను ఇమ్ము. NAND తర్కము నుంచి AND , OR మరియు NOT ద్వారములను రాభాట్టుము.

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SEMESTER – IV PAPER – V
II B.Sc.: PHYSICS SYLLABUS UNDER CBCS
MODERN PHYSICS

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 (Qualitative treatment), 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)

Nanomaterials – 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.

(NOTE: 1. Topics in Bold letters are added topics.
2. Problems should be solved at the end of every chapter of all units)

REFERENCE BOOKS:

- BSc Physics, Vol.4, Telugu Akademy, Hyderabad
- Atomic Physics by J.B. Rajam; S.Chand& Co.,
- Modern Physics by R. Murugeshan 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

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SEMESTER – 1V PAPER V
MODERN PHYSICS

Chapter / Unit	Section A (5 marks)	Section – B (10 marks)	Section – C (10 marks)
UNIT-I: **1. 1. Atomic and Molecular Physics:**	1+1 (Problem)	1	1
Unit-II: **2. Matter waves &Uncertainty Principle:**	1+1 (Problem)	1	1
UNIT-III: **3. Quantum (Wave) Mechanics**	1	1	1
Unit-IV: **4. Nuclear Physics**	1+1 (Problem)	1	1
Unit-V: **5. Nano materials** **6. Superconductivity**	1	1	1

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SEMESTER – IV PAPER – V
II B.Sc.: PHYSICS SYLLABUS UNDER CBCS
MODERN PHYSICS

TIME: 3Hrs **Max. Marks: 75**

SECTION-A

Answer any FIVE questions **5x5=25M**

1. Explain L-S coupling and J-J coupling.
   L-S సమ్మేళనము మరియు J-J సమ్మేళనములను గూర్చి వ్రాయుము.
2. Write about properties of matter waves?
   ద్రవ్యతరంగాల ధర్మాలు వ్రాయుము
3. Explain the Eigen functions and Eigen values.
   ఐగెన్ ప్రమేయము, ఐగెన్ విలువలను వివరించుము.
4. Explain elementary particles and their classification
   ప్రాధమిక కణాలు, వాటి వర్గీకరణ ను వివరించండి
5. Explain Classification of Nano materials
   నానో పదార్థములు,వాటి వర్గీకరణను వివరించుము.
6. A Sample is excited with a light of wavelength 4358 A°. Raman lines are observed at 4447 A^0. Calculate the Raman shift in cm^{-1}.
   ఒక నమూనా 4358 A^0 తరంగ ధైర్ఘ్యం కల కాంతితో ఉత్తేజపరచటమైనది. రామన్ రేఖను 4447 A^0 వద్ద గమనించడమైనది. అయితే రామన్ అంతరాన్ని సెం.మీ$^{-1}$. లలో కనుగొనుము.
7. An electron is confined to a box of length 10^{-9} m. Calculate the minimum uncertainty in its velocity.
   10^{-9} మీ. పొడవుగల పెట్టెలో ఎలక్ట్రాన్ సంచరిస్తే దాని వేగంలో కనిష్ఠ అనిశ్చితత్వాన్ని లెక్కించండి.
8. A neutron breaks into a proton and an electron. Calculate the mass defect in the reaction. (m_p=1.6725x10^{-27}Kg, m_e =9x10^{-31}kg, m_n=1.6747x10^{-27}Kg)
   ఒక కేంద్రక చర్యలో ఒక న్యూట్రాన్, ప్రోటాన్ మరియు ఎలక్ట్రానుగా విడిపోయింది . ఈ చర్యలో ద్రవ్యరాశి లోపం లెక్కించుము (m_p=1.6725X 10^{-27}Kg, m_e =9x10^{-31}kg, m_n=1.6747x10^{-27}Kg)

Answer any FIVE questions from sections B and C choosing atleast TWO questions from each section. Each question carries 10 marks. **5 x 10 = 50 M**

SECTION-B

9. Describe stern and Gerlach experiment. What is its importance?
   స్టెర్న్-గెర్లాక్ ప్రయోగమును వివరింపుము. ఆ ప్రయోగ ప్రాముఖ్యత ఏమిటి
10. Explain Devisson and Germer experiment for detection of matter waves.
    ద్రవ్య తరంగాలను శోధించుటకు డేవిసన్ మరియు గెర్మర్ ప్రయోగాన్ని వివరించుము.
11. Derive Schrödinger's time independent wave equation.
    కాలంపై ఆధారపడని ష్రోడింగర్ తరంగ సమీకరణమును ఉత్పాదించుము.
12. Explain the basic properties of nucleus.
    కేంద్రకము యొక్క ముఖ్య లక్షణాలను వివరింపుము
13. What is Nano dot? Explain the construction of Quantum Nano structures.
    క్వాంటం నానో బిందువు అంటే ఏమిటి? క్వాంటం నానో నిర్మాణాలను రూపొందించుటకు వివరించండి

SECTION – C

14. What is Raman Effect? Explain it experimentally.
    రామన్ ఫలితము అనగానేమి. దానిని ప్రయోగ పూర్వకంగా వివరించండి
15. State and explain Heisenberg's uncertainty principle. Explain the consequences of uncertainty principle with regard to diffraction by a single slit and Gamma ray microscope.
    హైసన్ బర్గ్ అనిశ్చితత్వ నియమాన్ని వ్రాసి వివరించుము. అనిశ్చితత్వ నియమము యొక్క పర్యవసానాలను ఏక చీలిక వద్ద వివర్తనము మరియు గామా కిరణ సూక్ష్మదర్శిని విషయములలో వివరించుము.
16. Obtain an expression for the energy of a particle in one dimensional potential well.
    ఏకమితీయ శక్మ కూపములోని కణము యొక్క శక్తికి సమీకరణాన్ని రాబట్టుము.
17. Describe the construction and working of G M counter?
    G M గణకం ను వర్ణించి, పనిచేయు విధానమును తెలుపుము
18. What is super conductivity? Explain Meissner effect. Mention the properties of super Conductivity.
    అతి వాహకత్వం అనగానేమి మైస్నర్ ఫలితంను వివరింపుము . అతివాహకాల ధర్మాలను తెలుపుము

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SEMESTER – V PAPER – VI (6)
III B.Sc.: PHYSICS SYLLABUS UNDER CBCS

LOW TEMPERATURE PHYSICS & REFRIGERATION

B Sc	Semester V (Skill Enhancement Course -Elective)	Credits: 4
Course: 6	Low Temperature Physics & Refrigeration	Hrs/Wk: 4

UNIT-I PRODUCTION OF LOW TEMPERATURE (10 hrs)

Production of low temperatures-Introduction, Joule-Thomson effect, Regenerative cooling, Different methods of liquefaction of gases, liquefaction of air-Claude's method, Production of liquid hydrogen and **Helium-Kapitza's method**, Adiabatic demagnetization, Properties of materials at low temperatures, Superconductivity **(qualitative treatment only).**

UNIT-II MEASUREMENT OF LOW TEMPERATURE (10 hrs)

Gas thermometer and its correction and calibration, Secondary thermometers, resistance thermometers, thermocouples, Vapour pressure thermometers, Magnetic thermometers, Advantages and drawbacks of each type of thermometer.

UNIT-III PRINCIPLES OF REFRIGERATION (10 hrs)

Introduction to Refrigeration- Natural and artificial refrigeration , Stages of refrigeration, Types of refrigeration -Vapor compression and vapor absorption refrigeration systems, Refrigeration cycle and explanation with a block diagram, **applications of Refrigeration** Introductory ideas on air-conditioning **(qualitative treatment only).**

Refrigerants-Introduction, Ideal refrigerant, Properties of refrigerant, **Requirement of refrigerants, Selection of refrigerants,** Classification of refrigerants, commonly used refrigerants, Eco-friendly refrigerants.

UNIT-IV COMPONENTS OF REFIGERATOR (10 hrs)

Refrigerator and its working, Block diagram, Coefficient of Performance (COP), Tons of refrigeration (TR) and Energy Efficiency Ratio (EER), ***Refrigerator components:*** Types of compressors, evaporators and condensers, **differences between Heat engine and refrigerator,** Refrigerant leakage and detection.

UNIT-V APPLICATIONS OF LOW TEMPERATURE & REFRIGERATION (10 hrs.)

Applications of Low temperatures: Preservation of biological material, Food freezing, liquid nitrogen and liquid hydrogen in medical field, Superconducting magnets in MRI.

Applications of refrigeration: Domestic refrigerators, Water coolers, Cold storages, Ice plants, Food preservation methods, Chemical and Process industries, Cold treatment of metals,

(NOTE: 1. Topics in Bold letters are added topics.
2. Problems should be solved at the end of every chapter of all units)

REFERENCE BOOKS

1. Heat and Thermodynamics by Brij Lal &N.Subramanyam, S.Chand Publishers.
2. Thermal Physics by S C Garg, R M Bansal & C K Ghosh, McGrawHill Education, India
3. Heat and Thermodynamics by M MZemansky, Mc Graw Hill Education (India).
4. Low-Temperature Physics by Christian E. & Siegfried H., Springer.
5. Thermal Engineering by S. Singh, S.Pati, Ch:18 Introduction to Refrigeration.
6. The Physics Hyper Text Book. Refrigerators.https://physics.info/refrigerators/
7. Refrigeration and Air Conditioning by Manohar Prasad, New age international (P) limited, New Delhi
8. A course in Refrigeration and Air Conditioning by S.C. Arora and S. Domkundwar, Dhanpatrai and sons, Delhi
9. https://trc.nist.gov/cryogenics/Papers/Review/2017-Low_Temperature_Applications_And_Challenges.pdf
10. https://nptel.ac.in/content/storage2/courses/112105129/pdf/RAC%20Lecture%203.pdf
11. Other Web sources suggested by the teacher concerned and the reading material. https://nptel.ac.in

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III BSc SEMESTER – V PAPER VI
LOW TEMPERATURE PHYSICS & REFRIGERATION

Chapter / Unit	Section A (5 marks)	Section – B (10 marks)	Section – C (10 marks)
UNIT-I PRODUCTION OF LOW TEMPERATURE	1	1	1
UNIT-II MEASUREMENT OF LOW TEMPERATURE	1	1	1
UNIT-III PRINCIPLES OF REFRIGERATION	2	1	1
UNIT-IV COMPONENTS OF REFIGERATOR	2	1	1
UNIT-V APPLICATIONS OF LOW TEMPERATURE & REFRIGERATION	2	1	1

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SEMESTER – V PAPER – VI (6)

III B.Sc.: PHYSICS SYLLABUS UNDER CBCS

LOW TEMPERATURE PHYSICS & REFRIGERATION

MODEL QUESTION PAPER

Time: 3 Hrs. **Max. Marks: 75M**

SECTION – A

Answer any FIVE questions. **5 x 5 = 25 M**

1. Discuss properties of materials at low temperature.
   అల్పఉష్ణోగ్రతల వద్ద పదార్థాల లక్షణాలను చర్చించండి.
2. Write a short note on secondary thermometer.
   సెకండరీ థర్మోమీటర్ గూర్చి లఘుటికను వ్రాయండి
3. Explain the stages of Refrigeration.
   శీతలీకరణ జరుగుటలో వివిధ దశలను వివరించండి.
4. Write a short note on Eco-friendly refrigerants.
   పర్యావరణ అనుకూల శీతలీకరణి గూర్చి లఘుటికను వ్రాయండి.
5. Write different types of compressors.
   వివిధ రకాల సంపిడకాల గూర్చి వ్రాయండి
6. Write the differences between Heat engine and refrigerator.
   ఉష్ణ యంత్రానికి మరియు శీతలీకరణ యంత్రానికి మధ్య భేదములను తెల్పుము
7. How to preserve the Bio-logical materials.
   జీవపదార్థాలను ఏ విధంగా నిల్వ ఉంచుతారు.
8. Write about uses of liquid hydrogen in medical field.
   ద్రవహైడ్రోజను వైద్య రంగంలో ఉపయోగించే విధానమును తెల్పుము

Answer any FIVE questions from sections B and C choosing atleast TWO questions from each section. Each question carries 10 marks. **5 x 10 = 50M**

SECTION -- B

09. Derive an expression for Joule-Thomson Cooling.
జౌల్ థామ్సన్ శీతలీకరణానికి సమీకరణమును ఉత్పాదించుము.

10. Describe the working of Gas thermometer and write its advantages and disadvantages.
గ్యాస్ ధర్మోమిటర్ పనిచేయు విధానమును వివరింపుము .దాని ప్రయోజనాలు మరియు అప్రయోజనాలను వ్రాయుము.

11. What is refrigeration? Explain the principle and working of a vapour compression Refrigeration system?
రిఫ్రిజరేసన్ అనగానేమి?సంపిడన ఆవిరి యంత్రం యొక్క పనితీరును వివరించుము?

12. Explain refrigeration cycle with block diagram.
బ్లాక్ రేఖాచిత్రం సహాయమున రిఫ్రిజరేసన్ వలయంను వివరించుము?

13. Explain the importance of liquid hydrogen and liquid nitrogen in medical field.
వైద్య రంగంలో ద్రవ హైడ్రోజన్ మరియు ద్రవ నైట్రోజన్ల పాత్రను వివరించండి.

SECTION – C

14. Explain Kapitza's method for liquefaction of helium gas with a neat diagram.
హీలియం వాయువును ద్రవీకరించడానికి కాపిట్జా పద్ధతిని చక్కటి పఠ సహాయమున వివరించుము

15. Describe the working of Magnetic thermometer and write its advantages and disadvantages.
మాగ్నెటిక్ ధర్మోమిటర్ పనిచేయు విధానమును వివరింపుము .దాని ప్రయోజనాలు మరియు అప్రయోజనాలను వ్రాయుము.

16. What is refrigeration? Explain the principle and working of a vapour absorption Refrigeration system?
రిఫ్రిజరేసన్ అనగానేమి?శోషణ ఆవిరి యంత్రం యొక్క పనితీరును వివరించుము?

17. Discus refrigerator components of a) Evaporator b) Condenser c) Compressor.
రిఫ్రిజరేటర్ లోని మూలకలైన a)ఆవిరి కారకం b)కండెన్సర్ c)కంప్రస్సర్

18. Explain the importance of superconducting magnet in MRI.
MRI లో అతివాహక అయస్కాంతాల ప్రాముఖ్యతను వివరించండి.

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SEMESTER – V PAPER – VII (7S)
III B.Sc.: PHYSICS SYLLABUS UNDER CBCS

SOLAR ENERGY AND APPLICATIONS

B Sc	Semester V (Skill Enhancement Course -Elective)	Credits: 4
Course: 7S	Solar Energy and Applications	Hrs/Wk: 4

Unit - I: BASIC CONCEPTS OF SOLAR ENERGY (10hrs)

Spectral distribution of solar radiation, Solar constant , zenith angle and Air-Mass, standard time, local apparent time, equation of time, direct, diffuse and total radiations. **Prediction of available solar radiation, Solar energy-Importance and global warming, Storage of solar energy, Solar pond.** Pyrheliometer - working principle, direct radiation measurement, Pyrometer-working Principle, diffuse radiation measurement, Distinction between the two meters.

Unit - II: SOLAR THERMAL COLLECTORS (10hrs)

Solar Thermal Collectors-Introduction, Types of Thermal collectors, Flat plate collector – liquid heating type, Energy balance equation and efficiency, **Solar Thermal Power Plant** Evacuated tube collector, Definitions of collector efficiency, Testing of flat-plate collector, solar water heating system, natural and forced circulation types. Concentrating collectors, Solar cookers, Solar dryers, Solar desalinators. **Solar greenhouses.**

Unit - III: FUNDAMENTALS OF SOLAR CELLS (10hrs)

Semiconductor interface, Types homo junction, hetero junction and Schottky barrier, advantages and drawbacks, Photovoltaic Effect, Photovoltaic cell, equivalent circuit, output parameters, conversion efficiency, **Photovoltaic applications, Solar photovoltaic cell and its working principle,** Measurement of I-V characteristics, series and shunt resistance of a solar cell, their effect on efficiency,

Unit -IV: TYPES OF SOLARCELLS AND MODULES (10 hrs)

Types of solar cells, Crystalline silicon solar cells, poly-Si cells, Thin film solar cells-CdTe/CdS and CuInGaSe2/CdS cell configurations, structures, advantages and limitations, Multi junction cells – Double and triple junction cells. Module fabrication steps, Modules in series and parallel, Bypass and blocking diodes. **Solar PV system and its components.**

Unit – V: SOLAR PHOTOVOLTAIC SYSTEMS (10hrs)

Energy storage in PV systems: Need of energy storage, Energy storage modes, electrochemical storage, Batteries: Primary and secondary, Solid-state battery, Molten solvent battery, lead acid battery and dry batteries-**Nickel Cadmium Batteries**, Electrical storage –**Differences between Capacitor and Battery**, Super capacitor. **Role of carbon Nano-tubes in electrodes.**

(NOTE: 1. Topics in Bold letters are added topics.
2. Problems should be solved at the end of every chapter of all units)

REFERENCE BOOKS:

III. References:

1. Solar Energy Utilization by G. D. Rai, Khanna Publishers
2. Solar Energy- Fundamentals, design, modelling and applications by G.N. Tiwari, Narosa Publications, 2005.
3. Solar Energy-Principles of thermal energy collection & storage by S.P. Sukhatme, Tata Mc-Graw Hill Publishers, 1999.
4. Science and Technology of Photovoltaics, P. Jayarama Reddy, CRC Press (Taylor & Francis Group), Leiden &BS Publications, Hyderabad, 2009.
5. Solar Photovoltaics- Fundamentals, technologies and applications, Chetan Singh Solanki, PHI Learning Pvt. Ltd.,
6. Web sources suggested by the teacher concerned and the college librarian including reading material.
   (a) https://courses.edx.org/c4x/DelftX/ET.3034TU/asset/solar_energy_v1.1.pdf
   (b) https://www.sku.ac.ir/Datafiles/BookLibrary/45/John%20A.%20Duffie,%20William%20A.%20Beckman(auth.)-Solar%20Engineering%20of%20Thermal%20Processes,%20Fourth%20Edition%20(2013).pdf .

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III BSc SEMESTER – V PAPER VII

MODERN PHYSICS

Chapter / Unit	Section A (5 marks)	Section – B (10 marks)	Section – C (10 marks)
UNIT-I: BASIC CONCEPTS OF SOLAR ENERGY	2	1	1
Unit-II: SOLAR THERMAL COLLECTORS	2	1	1
UNIT-III: FUNDAMENTALS OF SOLAR CELLS	1	1	1
Unit-IV: TYPES OF SOLARCELLS AND MODULES	1	1	1
Unit-V: SOLAR PHOTOVOLTAIC SYSTEMS	2	1	1

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SEMESTER – V PAPER – VII (7)
III B.Sc.: PHYSICS SYLLABUS UNDER CBCS

SOLAR ENERGY AND APPLICATIONS

MODEL QUESTION PAPER

Time: 3 Hrs. **Max. Marks: 75M**

SECTION – A

Answer any FIVE questions. **5 x 5 = 25 M**

1. Explain about spectral distribution of radiation.
   వికిరణము యొక్క వర్ణ పట వితరణను వివరించుము.
2. Define Solar constant, Air mass?
   సౌర స్థిరాంకం, గాలి ద్రవ్యరాశి లను నిర్వచించుము?
3. Explain different types of solar cells.
   సౌరఘటము లలోని వివిధ రకాలను వివరించుము.
4. Explain solar desalinator and drier?
   సౌర డిసాలినేటర్ మరియు డ్రయర్ గూర్చి వివరించుము ?
5. Explain photo voltaic effect?
   ఫోటో వోల్టాయిక్ ప్రభావాన్ని వివరించుము ?
6. Explain solar hot water system?
   సౌర వేడి జల వ్యవస్థ గూర్చి వ్రాయుము ?
7. Discuss different modes of energy storage
   శక్తిని నిల్వ చేయడంలోగల వివిధ రీతులను చర్చించుము.
8. Discuss need of energy storage.
   శక్తిని నిల్వ చేయవలసిన ఆవశ్యకతను తెలుపుము.

Answer any FIVE questions from sections B and C choosing atleast TWO questions from each section. Each question carries 10 marks. **5 x 10 = 50M**

SECTION – B

9. Describe how the solar constant is measured by using pyrheliometer?
   పైరహెలియోమీటర్ ఉపయోగించి సౌర స్థిరంకాన్ని ఏ విదంగా కొలుస్తారో వర్ణించుము?
10. Explain energy balance equation?
    శక్తి సమతుల్యత సమీకరణం గూర్చి వివరించుము ?
11. Draw solar cell output parameters? Explain series and shunt resistance of a solar cell?

సౌర ఘటము యొక్క ఔట్ పుట్ పారామితులు గీయుము ? సౌర ఘటము యొక్క శ్రేణి మరియు సమాంతర నిరోదాలను గురించి వివరించుము ?

12. Explain Thin film Solar cells?
సౌర ఘటములోని పలుచని పొరలు గూర్చి వివరింపుము.

13. Discuss about Solid – State and molten solvent batteries.
ఘనస్థితి మరియు మోల్టెన్ ద్రావణి బ్యాటరీలను గూర్చి చర్చించుము

SECTION – C

14. Write about the Importance of Solar Energy?
సౌర శక్తి యొక్క ప్రాముక్యతను తెలుపుము

15. What is flat plate collector? Describe liquid heating type FPC?
సమతల ఫలక గ్రాహకాలు అనగానేమి ? ద్రవాన్ని వేడిచేసే రకం FPC గూర్చి వర్ణించుము ?

16. Explain homo, hetero and schotty interfaces?
హోమో, హెటేరో మరియు స్కాటి అంతర తలాలు గూర్చి వివరించుము ?

17. Explain solar cell modular assembly? What type of steps involved in it?
సౌర ఘటం మడులర్ అసెంబ్లీని వివరించుము ?దానిలో ఇమిడియున్న అంచెలు ఎమిటి?

18. Explain role of carbon nano tubes in electrodes.
ఎలక్ట్రోడుల యందు కార్బన్ నానో గొట్టాల పాత్రను తెలుపుము□

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For 2022-2023 Batch (w.e.f. 2020-2021)
SEMESTER –II (Group A)
UG- SKILL DEVELOPMENT COURSE
SOLAR ENERGY

No. of Hours per week: 02 **Total Lectures: 30**

UNIT-I – Solar Radiation: (6 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

Co-curricular Activities (Hands on Exercises): (04 hrs)

[Any four of the following may be taken up]

1. Plot sun chart and locate the sun at your location for a given time of the day.
2. Analyse shadow effect on incident solar radiation and find out contributors.
3. Connect solar panels in series & parallel and measure voltage and current.
4. Measure intensity of solar radiation using Pyranometer and radiometers.
5. Construct a solar lantern using Solar PV panel (15W)
6. Assemble solar cooker
7. Designing and constructing photovoltaic system for a domestic house requiring 5kVA power
8. Assignments/Model Exam.

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.

Blue Print
SEMESTER -- II PAPER SD
SOLAR ENERGY

Module	5 marks		10 marks		Marks allotted
UNIT-I – Solar Radiation	**Section A**	**3**	**Section B**	**2**	**35**
UNIT-II – Solar Thermal Systems		**3**		**2**	**35**
UNIT-III – Solar Photovoltaic Systems		**2**		**2**	**30**
Total					**100**

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SEMESTER –II (Group A)
UG- SKILL DEVELOPMENT COURSE
SOLAR ENERGY

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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UG- SKILL DEVELOPMENT COURSE
SEMESTER –II (Group A)
SOLAR ENERGY MODEL QUESTION PAPER

Time: **2 Hrs** **SECTION-A** Max Marks: **50M**

Answer any **FOUR** questions. Each question carries 5 marks. **4 x 5M = 20M**

1. What is Photovoltaic Effect
   ఫోటో వోల్టాయిక్ ప్రభావం అనగానేమి ?
2. Discuss about Solar greenhouses
   సౌర గ్రీన్ హౌస్ గూర్చి చర్చించుము
3. Define Solar radiation and its uses
   సౌర వికిరణము ను నిర్వచించుము మరియు వాటి అనువర్తనాలను వ్రాయుము
4. Write about domestic lighting
   ఇంటికి ఉపయోగించే లైటింగ్ గూర్చి వ్రాయుము
5. Discuss about Sunshine recorder
   సూర్యరశ్మి రికార్డర్ గూర్చి చర్చించుము
6. Explain about the solar hot water systems
   సోలార్ వేడి జల వ్యవస్థను వివరించుము
7. Explain the Solar dryers
   సౌర డ్రయర్ గూర్చి వివరించుము ?
8. How can we Store the solar energy
   సౌర శక్తీ ని ఏవిధంగా నిల్వ చేస్తారు

SECTION – B

Answer any **THREE** questions. Each question carries 10 marks. **3 x 10M = 30M**

9. Discuss about the Solar radiation at the Earth's surface
   భూమి ఉపరితలం మీద ఉన్న సౌర వికిరణము గూర్చి చర్చించుము
10. What is solar energy? Explain its importance
    సౌర శక్తీ అనగానేమి ? దాని ప్రాముక్యతను వివరించుము
11. Explain the principle of conversion of solar radiation into heat?
    సౌర వికిరణము ఏవిధంగా ఉష్ణంగా మార్పిడి చెందుతుందో తెలిపే సూత్రమును వివరించుము
12. Discuss about the Solar Thermal Power Plant and its importance in daily life.
    సౌర థర్మల్ పవర్ ప్లాంట్ గూర్చి వివరించుము మరియు నిత్య జీవితంలో దాని ప్రాముక్యతను చర్చించుము .
13. Describe solar photovoltaic cell and its working principle
    సౌర ఫోటో వోల్టాయిక్ సెల్ యొక్క సూత్రమును మరియు పనిచేయు విధానమును వివరింపుము
14. Define a solar cell. Explain different types of Solar cells?
    సౌరఘటమును నిర్వచించుము ? వాటిలో రకాలు గూర్చి వివరించుము.

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