PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

(AN AUTONOMOUS COLLEGE WITH NAAC "A" GRADE)

Board of Studies for UG Programmes

RENEWABLE ENERGY

2024 – 2025

DEPARTMENT OF

PHYSICS & ELECTRONICS

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A), KAKINADA

DEPARTMENT OF PHYSICS & ELECTRONICS

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PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS) KAKINADA

DEPARTMENT OF COLLEGIATE EDUCATION
GOVERNMENT OF ANDHRA PRADESH

PROCEEDINGS OF THE PRINCIPAL, PITHAPUR RAJAH's GOVT. COLLEGE [A] :: KAKINADA

Present: Dr. B.V. THIRUPANYAM, Ph.D.

Rc.No.2/A.C/BOS/2024-25   **Dt.23 Apr 2024**

Sub: P.R.G.C[A] – Academic Cell - **Conduct of BOS Meetings for the Academic Year 2024-25** – Guidelines issued - Regarding.

The Autonomous colleges are, as per its vision, mission, stated objectives and core values, mandated to design and develop their own outcome -based curricula keeping in view the societal, local and global industry requirements, employability and industry – ready and transferable skills duly prescribing Course Outcomes (COs), Programme Outcomes (POs) and Program Specific Outcomes (PSOs) and suitable learning outcome assessment management system through robust and transparent evaluation system to measure their attainment levels by the students.

The Sustained Developmental Goals (SDG-4) of UNEP recommended assurance of quality to students in HEIs promoting creativity, critical thinking and collaborative skills, while building curiosity, courage, resilience and gender equality among students.

Further, the NEP-2020 recommended that the HEIs shall embark upon rolling out 21st century students capable of facing challenges, adaptive to changes, creative and innovative, well rounded students equipped with inventive and creative skills, out-of-box thinking skills, problem solving skills, employability skills,etc., that translate them into leaders and potential entrepreneurs. Hence, the policy recommended internships/ apprenticeships embedded programs. Further, the policy laid much emphasis on rolling out environmentally conscious, value driven, constitution-respecting and socially responsible citizens too.

The HEIs are also, as per the Revised Accreditation Framework [RAF] of NAAC, endowed with the responsibility of rolling out quality and holistic human resources to the modern Indian Economy by ingraining quality in teaching- learning process, integrating IT into teaching-learning and help students experience and prescribed a wide range of participative and experiential learning experiences including field trips, conferences, integration of technology, community service programmes, career guidance, certificate and value added courses, research and inquisition based teaching, exchange programmes, gender equity programmes, collaborations, consultancies, community outreach strategies and encouraged HEIs to be distinctive and unique in practices.

Besides, the students shall have social consciousness, regard for constitutional provisions, right perspective on environmental protection, awareness on gender equity, health and hygiene, Yoga and wellness, college social responsibility, culture and values, etc., to mention a few.

Further, the Ministry of India, GoI, through NIRF, prescribes quality research, infrastructure augmentation, enhanced placement and progression to higher education, equipment of employability skills leading to enhanced public perception about the college among the public.

Further, the A.P State Council of Higher Education, in the Post Graduation eco-system has come out with a revised curricular frame work from the Academic Year 2024-25 incorporating Skill Enhancement Courses, Open Online Courses, Indian Knowledge System, projects works in VI semester, besides new credit structure (APSCHE's curricular frame enclosed).

Our institution has, from AY 2022-23, has devised its new vision and mission along with objectives and core values necessitating design and re-orientation of its academic administration in tune with them.

ORDER:

In the light of the above mandate and responsibilities prescribed by institution's vision and mission, SDG-4, NEP – 2020, NAAC, NIRF to the autonomous HEIs, to meet the expectations of industries, students, Government and in tune with the APSCHE's revised and new P.G Curricular framework we need to customize, design and re-orient our academic and research administration.

Hence, the Chairmen of U.G and P.G Boards of Studies of various Departments are requested to make necessary arrangements for the conduct of the meetings in the Third week of April 2024. They are further requested to prepare curricula and extracurricular activities and devise suitable evaluation system keeping in mind above recommendations to make students a wholesome personality.

Further, the Chairman of the each BOS, in association with the IQAC coordinator, preceding the BOS meeting, is requested to prescribe benchmarking, quality initiatives in pedagogy and learning; in design of curriculum (with 20% change) and optimum utilization of existing human, physical and ICT resources and adopt resolutions to the extent of benchmarks (As per SOP given in **Annexure – I)**. Further, as the regular attendance of students to the classes is a deciding factor in enhancement of quality in learning, a minimum attendance of 75% for I & II mid-term examinations under CIA component shall be the benchmark for attendance and it shall be approved in the BOS. The Chairmen are also requested to approve the new programmes to be introduced for 2024-25, if any, number of certificate courses, their frequency, Bloom 's- Taxonomy based evaluation system for effective learning outcomes as per the Annexure – I.

Pre-BoS activity:

1. The Chairmen shall send the curricula designed for AY 2023-24 to the Industrialists, Alumni, parents and senior subject experts and get feed back and input on the quality of the syllabi, extra-curricular activities, student-centric activities by 6 April 2024.
2. The Chairmen are, therefore, requested to

- Design curricula of Odd and even semesters for the A.Y 2024-25 both for U.G (I to VIII semesters)and P.G(I to IV Semesters) courses in tune with the stated vision, mission of the institution, RAF of NAAC, NEP-2020 and NIRF.

- Conduct meeting with employers, parents, alumni, shall take feedback on the existing curricula and invite suggestions and changes to be made.
- Invite the University nominee, subject experts, industrial nominees, student nominees, parents well in advance along with the date, venue, agenda, etc. A soft copy shall be communicated well in advance to the members to have an idea on the matters.

- **The Subject experts should be preferably a Doctorate with more than 10 years of teaching experience. He should have experience in designing industry related, market and job oriented curriculum.**
- Facilitate much room for intense deliberation on the design of the curricula, evaluation system, research component, enhancing learning experiences, resource utilization by staff and students, etc.,
- Each Department shall approve and recommend additional credits for additional modules, training programmes, N.S.S, N.C.C, participation in cultural programs, sports and games, environmental programs, blood donations camps, etc.
- All meetings shall be offline. Online attendance of members faculty will be permitted only in exceptional cases.
- The Chairmen shall submit minutes of the meeting in the prescribed format only (Annexure – II) in triplicate (hard copies) to the Academic cell for onward submission to the IQAC, Examination cell and library within three days from the completion of BOS meeting and besides hosting the soft copy in the college website within the period stipulated.
- Each Chairman of BOS, shall get the rough draft of the curricula verified and approved by the Principal, Academic Cell and IQAC before the actual BOS meetings to ensure uniformity and commensurate with the stated vision and mission of the college among the departments.
- The Academic Cell coordinator shall be the Chief Coordinator for the BOS meeting activity and IQAC coordinator will be the additional coordinator.
- The Academic Coordinator and IQAC coordinators will conduct a meeting with the Chairmen, BOS on 25 April 2024 and explain the structure of curricula, uniformity other modalities.
- The Controller of Examinations of the institution shall fund the BOS meetings from the available funds on the condition of reimbursement after receiving autonomous funds from UGC. Initially, he shall pay Rs. 5,000/- uniformly as an advance to each Chairman towards each course (If BOS meetings for multiple courses are held under one Chairmanship, he/ she shall be given advance amount equivalent to the number of courses x Rs.5000/-)
- The Chairman of each BOS shall apply to the principal for advance amount for meeting the BOS meetings with head-wise expenditure in the prescribed format (Annexure-III).

  The chairmen of BOS are instructed to take suggestions from Industrialist (Part of Pre BOS) who is not in the previous BOS as member from industrialist category regarding the change in syllabus for the papers in BOS 2023-24 and proposal for new courses for the Academic year 2024-25 keeping in view of the future job opportunities .

S.No	Title of the Paper	Feedback or suggestions on the curriculum designed during 2023-24 BoS(Whether industry oriented/ relevant for equipping skills for 21st century students)	Proposal of New Courses for 2024-25	Justification

Following contents shall be presented in the BOS document in order

1. Proceedings of the Principal pertaining to BOS
2. Composition of BOS
3. Vision and Mission of the college
4. Agenda: It shall include ATR on the previous BOS meeting first, resolutions, etc., later.
5. Table showing the Allocation of Credits in the following table for both theory and Lab incase of science subjects

S. No	Semester	Title of the Course (Paper)	Hrs./week	Max. Marks (SEE)	Marks in CIA	Credits
1	III	Optics	4	50	50	4

6. Resolutions adopted in the meeting with detailed discussion that took place during the meeting (Activities and Bench marking as per Annexure –I)
7. At the end of each theory paper, each topic shall be mapped as per the Blooms taxonomy and scope of that topic for skill/ employability/ entrepreneurship opportunities in the following table incorporated

S. No	Subject	Semester	Title of the Course (Paper)	Topic	Parameter as per Blooms taxonomy (Knowledge/ Application/ Creativity/ Innovation	Experiential learning component	Scope (Skill/ employability/ entreprenuership)
1	III	Botany	Plant Physiology	Plant Cell	Knowledge	Shall be shown Microscope	
2	III	History	Tourism	Tourism management	Application	Apprenticeship	Employability

1. Each BOS Chairman shall, immediately after syllabus, tabulate the changes made in the syllabus/ paper along with justification, in the Proforma given in Annexure – I.

2. Attendance of Members present with signatures in the tabular form.

3. List of Examiners & Paper setters (Minimum 20 members list)

4. Syllabus for each course (both theory & Practical in case of Science subjects) followed by model question papers (theory & practical) and allocation of CIA (50marks) for each course with structure.

5. Each student (2024-25 AB) has to complete one MOOCS course from SWAYAM in any subject per year which is mandatory.

CIA structure for Single Major system

➢ Out of 50 marks for CIA, 25 marks are allocated for Mid examinations. In each semester two mid examinations to be conducted and the average of the two will be considered.

➢ I mid examination is to be conducted in offline mode at college level and II mid examination is to be conducted in online mode at department level.

➢ I mid examination to be conducted in offline mode in which the student should attempt **one essay** question for ten marks out of two questions, **two short** answer questions with five marks each out of four questions and five objective questions to be given for each paper.

➢ Question paper is to be given as per the following structure for the courses with **4 units**

➢ Question paper is to be given as per the following structure for the courses with **4 units**

S.No	Unit No	Long Answer Question(10M)	Short Answer Question(5 M)	Objective Questions(1M)
1	I	1	0	1
2	II	1	0	1
3	III	0	2	1
4	IV	0	2	1+ one question from anyunit with more syllabus weightage

➢ For I mid examination to be conducted in offline mode, Question paper is to begiven as per the following structure for the courses with **5 units**

S.No	Unit No	Long Answer Question(10M)	Short Answer Question(5M)	Objective Questions(1M)
1	I	1	0	1
2	II	1	0	1
3	III	0	1	1
4	IV	0	1	1
5	V	0	1+ one question from any unit(III or IV or V) with more syllabus weightage	1

➢ The remaining 25 marks for CIA are allocated as per the following structure.

Project-10M	Viva on theory- 3M	Assignment- 5M	Seminar- 5M	Clean & green and Attendance- 2M

CIA structure for 3 Major system

➢ Out of 50 marks for CIA, 25 marks are allocated for Mid examinations. In each semester two mid examinations to be conducted and the average of the two will be considered.
➢ I mid examination is to be conducted in offline mode at college level and II mid examination is to be conducted in online mode at department level.
➢ I mid examination to be conducted in offline mode in which the student should attempt **one essay** question for ten marks out of two questions, **two short** answer questions with five marks each out of four questions and five objective questions with one mark each.
➢ The remaining 25 marks for CIA are allocated as per the following structure.

Project-10M	Viva on theory- 3M	Assignment- 5M	Seminar- 5M	Clean & green and Attendance- 2M

CIA structure for 3 Major system for Honors programmes(2020-21AB)

➢ Out of 40 marks for CIA, 20 marks are allocated for Mid examinations. In each semester two mid examinations to be conducted and the average of the two will be considered.
➢ I mid examination is to be conducted in offline mode at college level and II mid examination is to be conducted in online mode at department level.
➢ I mid examination to be conducted in offline mode in which the student should attempt **Two essay** questions for ten marks each out of three questions, **four short** answer questions with five marks each out of six questions.
➢ The remaining 20 marks for CIA are allocated as per the following structure.

Assignment- 10M	Seminar- 5M	Quiz -5M

13. Percentage of syllabus changes in each paper
14. Measure outcome attainment learning levels of students through direct and indirect methodology and mapping COs and POs
15. Text & Reference Books
    e-content links

The BoS meetings should be conducted as per the scheduled timelines given below.

S.No	Activity	Scheduled Date
1	Issuing notification for conduct of BoS meetings	23.04.2024
2	Pre BOS (Offline/Online)	25.04.2024
3	Departmental level curricula design	27.04.2024
4	Finalization of draft BOS	27-04-2024
5	Scrutiny by academic cell	29-04-2024
6	Correspondence with Subject experts, University nominees, Industrialists	28-04-2024
7	BOS for UG & PG	30-04-2024

B. V. Jo

PRINCIPAL
P.R.Govt. College (A)
KAKINADA

Enclosures: Annexures- I, II & III
Copy to:
  Lecturers-in-Charge (BOS Chairmen) of all the
  departments
  Academic Coordinator
  IQAC coordinator
  Controller of Examinations
  Office

Proceedings of the Principal, Pithapur raja's Government College [A], Kakinada
Present: Dr.B.V Tirupanyam, M.Sc, Ph.D
Rc. No: 12A/A.C/BOS 2023-24,Dated:30.04.2024

Sub:- Pithapur raja's Government College [A], Kakinada – UG Boards of Studies (BoS) – Program Course-B.Sc/Physics Nomination of members - Orders Issued.

Ref:- UGC Guidelines for Autonomous colleges- 2018.

ORDER:

The Principal, Pithapur raja's Government College [A], Kakinada is pleased to constitute UG **Board of studies in PHYSICS** for framing the syllabi in Physics subject for all semesters duly following the norms of the UGC Autonomous guidelines.

S. No	Name of the Nominee	Designation
1.	Dr. M.Surekha Head of the Department	Chairman
2.	Dr.P.Paul Diwakar	University nominee, Y.V.N.R Government college,Kaikaluru
3.	Dr.K.Jyothi	Subject Expert, Principal SVRKGDC(M),Nidadavolu
4.	Dr. MVK Meher,	Subject Expert,Principal GDC Permallapuram
5.	Sri.A.V.V Prasad	Representative from Industry, Solar Systems,Kakinada
6.	Dr.K.Nanda Gopal	Sr.Scientific Asst.IMD,Alumni
7.	Dr.K.Jayadev	Member
8.	Ms G. Sridevi	Member
9.	Smt.A.Padmavathi	Member
10.	Dr S V G V A Prasad	Member
11.	Dr. P Himakar	Member
12.	Dr. K. Durga Rao	Member
13.	Smt S.K. Jubeda	Member
13.	Ms.D.Sravani	Member
14.	Mr.P.Veerendra	Member
15.	Ms. N. Kalpana	Member
15.	S. Mukhesh I B.Sc. (Renewable Energy)	Student Member
16.	N. Akhila I B.Sc. (Renewable Energy)	Student Member

The above members are requested attend the BOS meeting on 30-04-2024 and share their valuable views, suggestions on the following functionaries:

(a) Prepare syllabi for the subject keeping in view the objectives of the college, interest of the stake holders and national requirement for consideration and approval of the Academic Council

(b) Suggest methodologies for innovate teaching and evaluation techniques

(c) Suggest panel of names to the Academic council for appointment of examiners

(d) Coordinate research, teaching, extension and other activities in the department of the college.

The term of the members will be two years from the date of the nomination. The Chairman of the BoS (HoD/lecturer In-Charge of the department) is directed to coordinate with the Principal of the College and conduct BoS meetings as and when necessary, but at least once a year.

Vision

To provide the right academic environment paving way for intellectual excellence, humane feelings and social commitment. The college believes in providing quality education for the socially disadvantaged, economically weaker sections of the society and thereby helps them move upthe ladder of success and social order.

Mission

➢ To impart holistic education with special emphasis on character, culture, updated knowledge and skill-oriented learning.

➢ To make the students enjoy the fruits of globalization without prejudice to their local and cultural environment.

➢ To impart necessary life skills so as to make them face any challenge in the bigger world – Social, ethical, psychological or professional

Department of Physics and Electronics

BOARD OF STUDIES - PHYSICS

Meeting held on: Dt.17Th Aug 2023   Time:2 P.M. at Department of Physics.

Agenda of the Meeting

To discuss and approve:

1. Adoption of Single major system for the Ist year as per the guidelines of APSCHE
2. Adoption of Single minor system for the Ist year as per the guidelines of APSCHE
3. Revised-common program structure and semester wise curriculum.
4. Adoption of regulations on scheme of examination and marks/grading system.
5. Engaging of 7th hour of time table
6. Streamlining of regularity in attendance.
7. Value added courses viz. add on courses and skill development courses to be conducted by the department during the academic year 2024-25.
8. Make students access to ICT infrastructure for enhanced quality in higher education.
9. Remedial coaching for slow learners and project/ research work for advanced learners
10. Allocation of extra credits for extracurricular activities.
11. Conduct of parent teacher meeting.
12. Panel of Question paper setters and Examiners

13. Action plan for the academic year 2024-25.

14. Departmental budget proposal for the academic year 2024-25

15. Any other with the permission of the chair.

Action Taken Report 2023 - 24

        The Department of Physics conducted the BOS meeting for the academic year 2023-24 on 31.08.2023 in the Department of Physics. All the activities according to the plan of action were successfully completed in the proposed timeline. By taking the valuable recommendations of the members for enhancement of knowledge and to enrich the skills of the students, the department took initiatives and implemented various innovative steps viz.

1. Conducted awareness programme on usage of Waste material on 02.09.2023.

2. Sir C.V.Raman birth day celebrations on 07.11.2023

3. Distribution of Upkar scholarships to the poor students on 29.11.2023.

4. Parent Teacher meeting was conducted on 29.11.2023.

5. PG BOS for 2023-24 conducted on 04.12.2023.

6. Inauguration of certificate courses "Soldering and De soldering of Components" & "Household Electrical Wiring" in Sem IV @30 hrs on 08.12.2023.

7. Invited Talk on some aspects of thin films & Instrumentation by Dr. Tenneti Venkateswara Rao, Ph.D, IIT-Delhi on 29.01.2024.

8. Outreach Programme by our faculty on the eve of ANVESHAN-2024 conducted on 22.02.2024 at Mc. Laurin School, kkd.

9. Training on projects/ working models development to students on 23.02.2024 & 24.02.2024 by faculty of Dept. of Physics on the eve of ANVESHAN-2024

10. Teaching competency building training programme for Physics Teachers in our district by Dr K. Chandrasekhar Rao, Dept of Collegiate Education on 26.02.2024 on the eve of ANVESHAN-2024.

11. State level poster/ power point presentation on science / business projects on 27.02 2024 on the eve of ANVESHAN-2024.

                                                                  12.

13. 12. National Science day celebrations (Inauguration of Science park ,Open day science exhibition & prize distribution) was conducted on 28.02.2024.

14. 13.Einstein birth day celebrations conducted on 13.03.2024.

15. 13. Field visit was conducted to M.Sc Physics students at Rajamahendravaram Airport to create awareness on signaling & air traffic controlling by Airport authority of India on 22.04.2024.

                                                                  16.

DETAIL OF COURSE TITLES&CREDITS (A.Y.2023-24)

Sem	Course no.	Course Name	Course type (T/L/P)	Hrs./Wk.(Science)	Credits (Science: 4+1)	Max. Marks Cont/Internal/ MidAssessment	Max.Marks Semend Exam
I	1	Essentials and applications of Mathematical, Physical and Chemical Sciences	T	3+2	4	50M	50M
	2	Advances in Mathematical, Physical and Chemical Sciences	T	3+2	4	50M	50M
II	3	Renewable energy sources-1	T	3	3	50M	50M
		Renewable energy sources-1Practical Course	L	2	1		50M
	4	Renewable energy sources-2	T	3	3	50M	50M
		Renewable energy sources-2 Practical course	L	2	1		50M

Note: *Course type code: T: Theory, L: Lab

NEW COURSES INTRODUCED TITLES&CREDITS (A.Y.2024-25)

Sem	Course no.	Course Name	Course type (T/L/P)	Hrs./Wk.(Science)	Credits (Science: 4+1)	Max. Marks Cont/Internal/ MidAssessment	Max.Marks Semend Exam
III	5	Renewable energy systems analysis	T	3	3	50M	50M
		Renewable energy systems analysis Lab	L	2	1		50M
	6	Sustainable Energy and Environmental protection	T	3	3	50M	50M
		Sustainable Energy and Environmental protection Lab	L	2	1		50M
	7	Waves & Oscillations	T	3	3	50M	50M

		Waves & Oscillations Lab	L	2	1		50M
	8	Heat & Thermodynamics	T	3	3	50M	50M
		Heat & Thermodynamics Lab	L	2	1		50M
IV	9	Electronic devices and circuits	T	3	3	50M	50M
		Electronic devices and circuits Lab	L	2	1		50M
	10	Solar Energy and applications	T	3	3	50M	50M
		Solar Energy and applications Lab	L	2	1		50M
	11	Energy Storage Systems for Renewable Energy	T	3	3	50M	50M
		Energy Storage Systems for Renewable Energy Lab	L	2	1		50M

Note: *Course type code: T: Theory, L: Lab

Pithapur Rajah's Government College (Autonomous), Kakinada

Board of Studies–Department of Physics & Electronics

Resolutions of the Meeting - PHYSICS

The Board of Studies meeting was convened by the Physics & Electronics Department on 31- 08 -2023 at10 a.m. under the chairmanship of Smt. M. Surekha, In-charge of the Department., Dr. P. Paul Diwakar, University Nominee, Dr K Jyothi, Subject expert, Dr. M.V.K.Meher and Dr. D. Gangadhar, remaining external members, all the faculty members of Physics & Electronics and student representatives attended the meeting. The following agenda items are discussed and resolutions are made

Agenda 1: Adoption of Single major system for the Ist year as per the guidelines of APSCHE

Proposal: Put before the BOS members to discuss on the above agenda 2.

Discussion: Discussed on the introduction of Single major system in our undergraduate program as per the guidelines issued by APSCHE

Resolution Adopted: All the BOS members have approved the adoption of Single major system for the Ist year as per the guidelines of APSCHE

Agenda 1(a): Adoption of Single minor system for the Ist year in Sem II as per the guidelines of APSCHE

Proposal: Put before the BOS members to discuss on the above agenda 2.

Discussion: Discussed on the introduction of Single minor system in our undergraduate program as per the guidelines issued by APSCHE

Resolution Adopted: All the BOS members have approved the adoption of Single minor system for the Ist year in Sem II as per the guidelines of APSCHE

Agenda 2 : Revised-common program structure and semester wise curriculum.

Proposal: Placed before the BOS members to discuss on the above agenda 2.

Discussion: Discussed the entire program structure

Resolution Adopted: Resolved to adopt the revised common program structure and verified course wise syllabi as per guidelines issued by APSCHE and ANUR. Also discussed and approved the revised course wise structure, Syllabi, Blue print and model papers of **Semesters I – V** for the academic year 2023-24.

Agenda 3: Adoption of regulations on scheme of examination and marks/grading system.

Proposal: It is put before the BOS members to discuss on the above agenda 3.

Discussion: Discussed the Continuous Internal Assessment (CIA):Examination pattern.

Resolution Adopted: Approved the Mode of internal assessment, pattern of examination of internal assessment and scheme of evaluation of practical exams of Semesters II -V as external 50Marks and internal assessment 50Marks. All the practical classes of Semesters I-V will be conducted for 2Hrs.

It is resolved to approve the split up of Continuous Comprehensive Evaluation CCE – 50 Marks for **Semesters I-V**as follows:

Examination	Mode of Assessment	Marks allotted
(CIA) Continuous Internal Assessment SEM I-V	Student study Project	10
	Viva Voce	3
	Seminar and Group Discussion	5
	Assignment	5
	Clean & Green and attendance	2
	Average of 2 Mid examinations conducted @25marks	25
TOTAL MARKS		**50**

- It is resolved to conduct 2 mid examinations @ 25 marks of each for **Semesters I-V** and the student should attend at least one internal exam. It is also resolved to conduct one mid exam through ICT platform (Online)

- Discussed and approved the scheme of evaluation of practical examinations for all the I –Vsemesters.

- It is resolved to approve the conduct of semester end practical exams only with internal examiners for odd semester and with both internal and external examiners for even semesters at the end of each semester.

- Resolved and approved the blue print, model papers of semester end examinations for all the I –V semesters.

Agenda 4: Engaging of 7th hour of time table

Proposal: It is Presented before the BOS members for discussion on this agenda point

Discussion: Discussed the engagement of 7thhr introduced by APCCE

Resolution Adopted: It is resolved to dedicate the7th hour classes for extra-curricular activities and

student counseling by class mentors.

Agenda 5: Streamlining of regularity in attendance.

Proposal: It is put before the BOS members to discuss the above agenda point 5.

Discussion: Discussed the measures to be taken for improving the regularity of the students

Resolution Adopted: Resolved to make the **75% of attendance is mandatory** to appear for both the **1ˢᵗand 2ⁿᵈmid term examinations** and also it is resolved that the student should attend at least one internal exam to appear for the Semester end examination.

Agenda 6: Certificate courses viz. add on courses and skill development courses to be conducted by the department during the academic year 2023-24.

Proposal: It is placed before the BoS members to discuss on the above agenda 6.

Discussion: Discussed the LSCs and SDCs to be included.

Resolutions Adopted:

- Resolved to start a value-added certificate course "

- **Lab equipment trouble shooting"** for **Sem III** @30 hrs. for 2 credits having 5units @ 2 theory hrs. per week and one Study Project at the end ofthe course, designed by the Department.

- Resolved to adopt Community Service Project for all the students at the end of **Sem –II**.

Agenda 7: Collaboration with industry and third-party sector organization in view of industrial internship.

Proposal: It is placed before the BoS members to discuss on the above agenda 7.

Discussion: Discussed on collaboration with industry and third-party sector organization in view of industrial internship

Agenda 8: Make students access to ICT infrastructure for enhanced quality in higher education.

Proposal: It is placed before the BoS members to discuss on the above agenda 8.

Discussion: Discussed on making the students access to ICT infrastructure for enhanced quality in higher education.

Resolutions Adopted: By identifying various modules and topics for ICT platform and to develop e-content in 4- quadrants method to the students and upload in the college website.

Agenda 9: Remedial coaching for slow learners and project/ research work for advanced learners

Proposal: It is placed before the BoS members to discuss on the above agenda 9.

Discussion: Discussed on remedial coaching for slow learners and project/ research work for advanced learners

Resolutions Adopted: Resolved to adopt a benchmark from previous appeared examinations to divide the students into three categories

- Resolved to take '**O'** as benchmark for advanced learners to assign critical assignments, project/research works and ICT based class seminars

- Resolved to take '**B**' as benchmark for moderate learners to assign assignments and class seminars
- Resolved to take '**F**' as benchmark for slow learners to conduct remedial coaching

Agenda 10: Allocation of extra credits for extracurricular activities.

Proposal: It is presented before the BOS members to discuss on the above agenda10.

Discussion: Discussed the allocation of extra credits for extracurricular activities

Resolution Adopted: Approved to give extra credits for MOOCS courses, N.S.S., N.C.C., winners of zonal level sports and games competitions, participation in state level/ National level competitions, blood donations camps, environmental programs like extending services in facing the natural calamities etc.as mentioned in the following table.

Agenda11: Conduct of parent teacher meeting.

Proposal: It is presented before the BOS members for the discussion on this agenda point 12

Discussion: Discussed the conduct of parent teacher meeting

Resolution Adopted: Approved and resolved to conduct parent teacher meeting twice in the academic yearat each semester and to make them aware of their role as stakeholders in the college administration.

Agenda 12: Panel of examiners to be approved in BOS.

Proposal: It is presented before the BOS members to discuss on the above agenda 13.

Discussion: Discussed the panel of Question paper setters and examiners.

Resolution Adopted: Approved and resolved.

Agenda 13: Action plan for the academic year 2023-24.

Proposal: It is put before the BOS members to discuss on the above agenda 14.

Discussion: Discussed the action plan to implement the departmental activities more effectively as perthe plan.

Resolution Adopted: It is resolved to approve Department Action Plan for the AcademicYear2023-24

Agenda 14: Departmental budget proposal for the academic year 2023-24

Proposal: It is presented before the BOS members to discuss on the above agenda 15.

Discussion: Discussed the budget proposal

Resolution Adopted: Approved the budget proposal for the academic year 2023-24.

Certificate

The syllabus and model question papers including blueprint in physics subject for 3 years BSc course for the semesters I, II,III and IV for the academic years 2024- 25 list of examiners andpaper setters' departmental activities which contains pages is approved in the board of studies meeting held in blended mode through the Google meet app on 30.04.2024

S.No.	Members of Board of Studies		Signature
1	Dr. M. Surekha	Chairman	
2	Dr. P. Paul Diwakar	University nominee, Lec.In Phy,Y.V.N.R. Government College, Kaikaluru.	
3	Dr. K. Jyothi	Subject Expert; Principal; SVRKGDC(M), Nidadavolu	
4	Dr. M.V.K. Meher	Subject Expert, Lec.in charge/ Phy/A.S.D. Degree College (W), Kakinada.	
5	Sri A.V.V.V. Prasad	Representative from Industry, Solar Systems, Kakinada.	
6	Dr. K. Nanda Gopal	Sr. Scientific Asst., Indian Meteorology Dept, Alumni	
7	Dr. K. Jayadev	Member	
8	Ms. G. Sridevi	Member	
9	Ms. A. Padmavathi	Member	
10	Dr. S.V.G.V.A. Prasad	Member	
11	Dr P. Himakar	Member	
12	Dr. K. Durga Rao	Member	
13	Ms. D. Sravani	Member	
14	Mr. P. Veerendra	Member	
15	S. Mukhesh I B.Sc. (Renewable Energy)	Student Member	
16	N. Akhila I B.Sc. (Renewable Energy)	Student Member	

PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A)Kakinada
Blue print for the model paper – Physics

Semester End External Examination
For I to IV Semester core courses
2024– 2025

S. No.	Type of question	Given in the Question paper			To be answered		
		No. of Questions	Marks allotted To each question	Total marks	No. of Questions	Marks allotted To each question	Total marks
1	Section – A Essay question	6	10	60	3	10	30
2	Section – B Short answer Question	7	5	35	4	5	20
TOTAL		13		95	07		50

$$\text{Percentage of Choice} = \frac{(95-50)}{95} \textbf{ X 100 =} \frac{45}{95} \textbf{ x 100 = 47\%}$$

PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A)Kakinada

Blue Print for Internal Theory (Mid) Examination

For Single Major system

S. No.	Type of question	Unit	No. of Questions	No. of Questions Given				No. of Questions to be answered		
				Total Quetions	Marks allotted To each question	Total marks		No. of Questions	Marks allotted To each question	Total marks
1	**Section – A** Essay question	I	1	2	10	20		1	10	10
		II	1							
2	**Section – B** Short answer Questions	III	2	4	5	20		2	5	10
		IV	2							
3	**Section – C** Objective type questions	One question from each unit		5	1	5		5	5	5
	TOTAL					45				25

Percentage of Choice given $= \dfrac{45-25}{45} \times 100 = 44.44\,\%$

The total of two internals is reduced to 25 marks and the other 25 marks allocated forCCE are further divided as follows

Study project	= 10 marks
(Theoretical for odd Sem / Practical for even Sem)	
Viva on subject	=3 marks
Assignment	= 5marks
Seminar	= 5 marks
Clean & Green and Attendance	=2 marks
Total	**= 25 marks**

Blue print for Semester End Practical examination
For I, II Year

Practical Paper

Scheme of Valuation for Practicals

Time: 2 hrs.   Max. Marks: 50

1. Formulae & Explanation   - 10 Marks
2. Tabular form + graph + circuit diagram   - 10 Marks
3. Observations   - 10 Marks
4. Calculation, graph, precaution and results - 10 Marks
5. Viva voice   - 05 Marks
6. Record   - 05Marks

Note: Minimum of 6 experiments to be done and recorded.

	P.R. Government College (Autonomous) Kakinada	
	Department of Physics	
	B.Sc. Program outcomes	
PO 1	**Domain Expertise**	• Acquire comprehensive domain knowledge and skills. • Make use of the knowledge in an innovative manner
PO 2	**Life-long Learning and Research:**	• Learn "how to learn"- Self-motivated and self-learning. • Adopt to the ever-emerging demands of work place and life. • Investigate the problem and report in a proper manner.
PO 3	**Modern Equipment Usage**	• Adopt ICT mode of learning effectively. • Access, retrieve and use authenticated information. • Have knowledge of software applications to analyze data • Usage of technology without deviating from the dedication of learning.
PO 4	**Computing Skills and Ethics**	• Develop rational and scientific thinking • Ensure the human values & ethics and to follow them throughout the life.
PO 5	**Complex problem Investigation & Solving**	• Predict and analyze problems. • Frame hypotheses. • Investigate and interpret empirical data. • Plan and execute action.
PO 6	**Perform effectively as Individuals and in Teams**	• Work efficiently as an individual • Cooperate, coordinate and perform effectively in diverse teams/groups.
PO 7	**Efficient Communication & Life Skills**	• To face challenges and self-sustainability in overcoming the psychological problems. • Listen, understand and express views in a convincing manner. • Develop skills to present information clearly and concisely to interested groups.
PO 8	**Environmental Sustainability**	• Following the green energy measures. • Understand sensibly the environmental challenges. • Think critically on preventing of

PO			
			• environmental pollution.
			• Propagate and follow environment friendly practices.
PO 9	**Societal contribution**		• Involve voluntarily in social development activities at Regional, National levels. • Voluntary participation in serving the society from natural calamities viz. disasters, cyclones, epidemics. • Be a patriotic citizen to uphold the constitutional values of the Nation.
PO 10	**Effective Project Management**		• Adoption of changes time to time in accordance with the situations. • Identify the goals, objectives and components of a project for its completion. • Plan, organize and direct the endeavors of teams to achieve the targets in time. • Be competent in identifying opportunities and develop strategies and decision making for contingencies.

New Courses introduced during the year 2023 – 24

S.NO	Sem	Course no.	Title of the Paper
1	III	5	Renewable energy systems analysis
			Renewable energy systems analysis Lab
		6	Energy Policy and Sustainable Development
			Energy Policy and Sustainable Development lab
		7	Waves & Oscillations
			Waves & Oscillations Lab
		8	Heat & Thermodynamics
			Heat & Thermodynamics Lab
2	IV	9	Electronic devices and circuits
			Electronic devices and circuits Lab
		10	Solar Energy and applications
			Solar Energy and applications Lab
		11	Energy Storage Systems for Renewable Energy
			Energy Storage Systems for Renewable Energy Lab

	Pithapur Rajahs Government College (Autonomous) Kakinada	**Program & Semester** I B.Sc. (I Sem) COURSE-1 W.e.f. 2023 - 24 ADMITTED BATCH			
Course Code PHEAMPC24	**ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICALANDCHEMICAL SCIENCES**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:	Different types of Physical quantities, Basic mathematical equations & formulae, Forces and its properties, knowledge about celestial bodies	5	0	-	4

Course Objective:

The objective of this course is to provide students with a comprehensive understanding of the essential concepts and applications of mathematical, physical, and chemical sciences. The course aims to develop students' critical thinking, problem-solving, and analytical skills in these areas, enabling them to apply scientific principles to real-world situations.

Learning outcomes:

1. Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures.

2. o Explain the basic principles and concepts underlying a broad range of fundamental areas of physics and to Connect their knowledge of physics to everyday situations

3. To Explain the basic principles and concepts underlying a broad range of fundamental areas of chemistry and to Connect their knowledge of chemistry to daily life.

4. Understand the interplay and connections between mathematics, physics, and chemistry in various applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.

5. To explore the history and evolution of the Internet and to gain an understanding of network Security concepts, including threats, vulnerabilities, and countermeasures.

UNIT II: ESSENTIALS OF PHYSICS:

Definition and Scope of Physics- Measurements and Units - Motion of objects: Newtonian Mechanics and relativistic mechanics perspective - Laws of Thermodynamics and Significance- Acoustic waves and electromagnetic waves- Electric and Magnetic fields and their interactions- Behavior of atomic and nuclear particles- Wave-particle duality, the uncertainty principle- Theories and understanding of universe

UNIT IV: APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY:

Application of Physics in Industry and Technology: Electronics and Semiconductor Industry, Robotics and Automation, Automotive and Aerospace Industries, Quality Control and Instrumentation, Environmental Monitoring and Sustainable Technologies.

Reference Books:

1. University Physics with Modern Physics by Hugh D. Young and Roger A. Freedman
2. Fundamentals of Physics by David Halliday, Robert Resnick, and Jearl Walker
3. Physics for Scientists and Engineers with Modern Physics" by Raymond A. Serway and John W. Jewett Jr.
4. Physics for Technology and Engineering" by John Bird

STUDENT ACTIVITIES:

UNIT II: ESSENTIALS OF PHYSICS:

1. Concept Mapping

Divide students into groups and assign each group one of the topics.

Students will create a concept map illustrating the key concepts, relationships, and applications related to their assigned topic.

Encourage students to use visual elements, arrows, and labels to represent connections and interdependencies between concepts.

2. Laboratory Experiment

Select a laboratory experiment related to one of the topics, such as motion of objects or electric and magnetic fields.

Provide the necessary materials, instructions, and safety guidelines for conducting the

experiment.

 Students will work in small groups to carry out the experiment, collect data, and analyze theresults. After the experiment, students will write a lab report summarizing their findings, observations, and conclusions.

UNIT IV: APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY

1: Interdisciplinary Case Studies

Divide students into small groups and provide them with interdisciplinary case studies that involve the interdisciplinary application of mathematics, physics, and chemistry.

Each case study should present a real-world problem or scenario that requires the integration of concepts from all three disciplines.

2: Design and Innovation Project

Challenge students to design and develop a practical solution or innovation that integrates mathematics, physics, and chemistry principles.

Students can choose a specific problem or area of interest, such as renewable energy, environmental conservation, or materials science.

3: Laboratory Experiments

Assign students laboratory experiments that demonstrate the practical applications of mathematics, physics, and chemistry.

Examples include investigating the relationship between concentration and reaction rate,analyzing the behavior of electrical circuits, or measuring the properties of materials.

Pithapur Rajah's Government College (Autonomous), Kakinada
I B.Sc., SEMESTER–I
W.e.f. 2023 - 24 ADMITTED BATCH
COURSE 1 BLUE PRINT

Course Code: **No. of credits: 03 Hours/Week** **Total hours: 60hrs**

Course Code: **No. of Credits: 04**

Answer **ANY THREE** questions by choosing at least one from each Section

Section	Questions to be given	Questions to be answered	Marks
A	6	3	3 x 10M = 30M
B	7	4	4 x 5 M = 20M
Total	13	7	50M

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
I	1	2	20
II	1	1	15
III	1	2	20
IV	2 (M,P)	1(C)	25
V	1	1	20
			95

$$\text{Percentage of Choice} = \frac{(95-50)}{95} \text{ X 100} = \frac{45}{95} \text{ x 100} = 47\%$$

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A),

KAKINADA   I B.Sc., SEMESTER–I

W.e.f. 2023 - 24 ADMITTED BATCH

COURSE 1

Course Code: No. of credits: 03   3Hours/Week   Total hours: 60hrs

 Note: -Set the question paper as per the blue print given at the end of this model paper.

Time: 2 $\frac{1}{2}$ Hours   Max Marks: 50

PART-I

Answer **any Three** questions by attempting at least one question form each section 3 X 10= 30 Marks

SECTION-A

1. Essay question from UNIT- I

2. Essay question from UNIT- II

3. Essay question from UNIT- II

SECTION-B

4. Essay question from UNIT-III

5. Essay question from UNIT-IV

6. Essay question from UNIT- V

PART-II

Answer **any Four** Questions from the following   4 X 5= 20 Marks

7. Short answer question from UNIT - I

8. Short answer question from UNIT - II

9. Short answer question from UNIT - III

10. Short answer question from UNIT - IV

11. Short answer question from UNIT - V

12. Problem from UNIT - I

13. Problem from UNIT - III

	Pithapur Rajahs Government College (Autonomous) Kakinada	**Program & Semester** I B.Sc. (I Sem) COURSE-2 W.e.f. 2023 - 24 ADMITTED BATCH			
Course Code PHAMPC24	**ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES**				
Teaching	**Hours Allocated: 60 (Theory)**	L	T	P	C
Pre-requisites:	Different types of Physical quantities, Basic mathematical equations & formulae, Forces and its properties, knowledge about celestial bodies	5	0	-	4

Course Objective:

The objective of this course is to provide students with an in-depth understanding of the recent advances and cutting-edge research in mathematical, physical, and chemical sciences. The course aims to broaden students' knowledge beyond the foundational concepts and expose themto the latest developments in these disciplines, fostering critical thinking, research skills, and the ability to contribute to scientific advancements

Learning outcomes:

1. Explore the applications of mathematics in various fields of physics and chemistry, to understand how mathematical concepts are used to model and solve real-world problems.

2. To Explain the basic principles and concepts underlying a broad range of fundamental areasof physics and to Connect their knowledge of physics to everyday situations.

3. Understand the different sources of renewable energy and their generation processes and advances in nanomaterials and their properties, with a focus on quantum dots. To study the emerging field of quantum communication and its potential applications. To gain an understanding of the principles of biophysics in studying biological systems. Explore the properties and applications of shape memory materials.

3. Understand the principles and techniques used in computer-aided drug design and drug delivery systems, to understand the fabrication techniques and working principles of nano sensors. Explore the effects of chemical pollutants on ecosystems and human health.

4. Understand the interplay and connections between mathematics, physics, and chemistry in various advanced applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.

5 Understand and convert between different number systems, such as binary, octal, decimal, and hexadecimal. Differentiate between analog and digital signals and understand their characteristics. Gain knowledge of different types of transmission media, such as wired (e.g., copper cables, fiber optics) and wireless (e.g., radio waves, microwave, satellite).

UNIT II: ADVANCES IN PHYSICS:

Renewable energy: Generation, energy storage, and energy-efficient materials and devices.
Recent advances in the field of nanotechnology: Quantum dots, Quantum Communication- recent advances in biophysics- recent advances in medical physics- Shape Memory Materials.

UNIT IV: ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY

Application of Renewable energy: Grid Integration and Smart Grids,

Application of nanotechnology: Nanomedicine,

Application of biophysics: Biophysical Imaging, Biomechanics, Neurophysics,

Application of medical physics: Radiation Therapy, Nuclear medicine

Recommended books:

1. Renewable Energy: Power for a Sustainable Future" by Godfrey Boyle

2. "Energy Storage: A Nontechnical Guide" by Richard Baxter

3. "Nanotechnology: Principles and Applications" by Sulabha K. Kulkarni and Raghvendra A. Bohara

4. "Biophysics: An Introduction" by Rodney Cotterill

5. "Medical Physics: Imaging" by James G. Webster

STUDENT ACTIVITIES

1: Case Studies

Provide students with real-world case studies related to renewable energy, nano technology, biophysics,medical physics, or shape memory materials.

Students will analyze the case studies, identify the challenges or problems presented, and proposeinnovative solutions based on the recent advances in the respective field.

They will consider factors such as energy generation, energy storage, efficiency, sustainability, materials design, biomedical applications, or technological advancements.

2: Experimental Design

Assign students to design and conduct experiments related to one of the topics: renewable energy,nanotechnology, biophysics, medical physics, or shape memory materials.

They will identify a specific research question or problem to investigate and design an experiment accordingly.

Students will collect and analyze data, interpret the results, and draw conclusions based on their findings. They will discuss the implications of their experimental results in the context of recent advances in the field.

3: Group Discussion and Debate

Organize a group discussion or debate session where students will discuss the ethical, social, and environmental implications of the recent advances in renewable energy, nanotechnology, biophysics,medical physics, and shape memory materials.

Assign students specific roles, such as proponent, opponent, or moderator, and provide them with key points and arguments to support their positions.

Pithapur Rajah's Government College (Autonomous), Kakinada
I B.Sc., SEMESTER–I

W.e.f. 2023 - 24 ADMITTED BATCH

COURSE 2 BLUE PRINT

Course Code: No. of credits: 03 Hours/Week   Total hours: 60hrs

Course Code: PH3202   **No. of Credits: 04**

Answer **ANY THREE** questions by choosing at least one from each Section

Section	Questions to be given	Questions to be answered	Marks
A	6	3	3 x 10M = 30M
B	7	4	4 x 5 M = 20M
Total	13	7	50M

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
I	1	2	20
II	1	1	15
III	1	2	20
IV	2 (M,P)	1(C)	25
V	1	1	20
95			

$$\text{Percentage of Choice} = \frac{(95-50)}{95} \textbf{ X 100 = } \frac{45}{95} \textbf{ x 100 = 47\%}$$

PITHAPUR RAJAHS GOVERNMENT COLLEGE (A), KAKINADA

I B.Sc., SEMESTER–I

W.e.f. 2023 - 24 ADMITTED BATCH

COURSE 2 MODEL PAPER

Course Code: **No. of credits: 03Hours/Week**   **Total hours: 60hrs**

__Note:__ -Set the question paper as per the blue print given at the end of this model paper.

Time: $2\frac{1}{2}$ Hours   Max Marks: 50

PART-I

Answer __any Three__ questions by attempting at least one question form each section 3 X 10= 30 Marks

SECTION-A

1. Essay question from UNIT- I

2. Essay question from UNIT- II

3. Essay question from UNIT- III

SECTION-B

4. Essay question from UNIT-IV

5. Essay question from UNIT-IV

6. Essay question from UNIT- V

PART-II

Answer __any Four__ Questions from the following   4 X 5= 20 Marks

3. Short answer question from UNIT - I

4. Short answer question from UNIT - II

5. Short answer question from UNIT - III

6. Short answer question from UNIT - IV

7. Short answer question from UNIT - V

8. Problem from UNIT - I

9. Problem from UNIT - III

	Pithapur Rajah's Government College (Autonomous) Kakinada	**Program & Semester** I B.Sc. (II Sem) W.e.f. 2023 - 24 ADMITTED BATCH			
Course 3 Code: RES1-24	**RENEWABLE ENERGY RESOURCES-1**				
Teaching	Hours Allocated: 45 (**Theory**)	L	T	P	C
Pre-requisites:	Units of Energy & Power, Primary & Secondary, Commercial & Non Commercial, EM Spectrum, and Photo Electric effect, Bureau of Energy Efficiency, Wind energy, Ocean energy, Bio-energy.	3	0	-	3

UNIT-I (10hrs)

Introduction to Energy: Definition and units of energy - Joule, Erg, Calorie, Ton of Coal Equivalent, Ton of oil equivalent, Ton of TNT, KWH, electron Volt, British Thermal Unit, Definition and Units of Power – Watt, Horse power, Ton of refrigeration, Ton of air cooling.

Classification of energy resources: Primary-Secondary, Conventional-Non conventional, Renewable-Nonrenewable, Green energy, Clean energy (Definitions and examples), Green Foot print, Carbon Foot print Concepts.

Bureau of Energy Efficiency–Actions and Activities, BE Star label, ISEER introduction.

UNIT-II (10 hrs)

Solar constant, Solar Radiation spectrum, Classification of Solar cells - First generation, Second Generation, Third Generation. Key elements of Silicon Solar cell, PV Solar cell, Module, panel and array. Solar Thermal systems types, applications of Solar PV and Solar Thermal systems.

UNIT-III (8 hrs)

Wind Energy: Origin of winds, Wind turbine site selection (Shobh Nath Singh 6.5), Wind Turbine Types and Their Construction (B H Khan 7.8)

UNIT-IV (10 hrs)

Ocean Energy: Origin and nature of tidal energy, Ocean tidal energy conversion schemes, Wave energy technology, Ocean thermal energy conversion technology (Open cycle, closed cycle and Hybrid cycle).(BH Khan Ch.10,ShobhNathSingh Ch.11,12,13)

UNIT-V (7 hrs)

Bio-Energy: Photosynthesis, Usable forms of Biomass, Biomass resources, Biomass conversion technologies – Wet processes, Dry processes.

References:-

1. Non- Conventional Energy Sources, G. D. Rai, New Delhi.

2. Non-conventional Energy Resources, B.H.Khan,3rdEd,Tata McGrawHill (2017)

3. Nonconventional Energy Resources, Shobh Nath Singh, Pearson India (2017)

PITHAPUR RAJAHS GOVERNMENT COLLEGE (A), KAKINADA

B.Sc., SEMESTER–II   PAPER 3   W.e.f. 2023 - 24 ADMITTED BATCH

Renewable Energy resources-1

Course Code: **03 Hours/Week**   **Total hours: 45 hrs**

Course Code: **No. of Credits: 04**

Answer **ANY THREE** questions by choosing at least one from each Section

Section	Questions to be given	Questions to be answered	Marks
A	6	3	3 x 10M = 30M
B	7	4	4 x 5 M = 20M
Total	13	7	50M

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
I	2	1	25
II	1	1	15
III	1	1	15
IV	1	2	25
V	1	2	15
			95

$$\text{Percentage of Choice} = \frac{(95-50)}{95} \times 100 = \frac{45}{95} \times 100 = 47\%$$

PITHAPUR RAJAHS GOVERNMENT COLLEGE (A), KAKINADA

I B.Sc., SEMESTER–II   PAPER 3

W.e.f. 2023 - 24 ADMITTED BATCH

Renewable Energy resources-1

Course Code: No. of credits: 03 Hours/Week   Total hours: 45hrs

Note: -Set the question paper as per the blue print given at the end of this model paper.

Time: $2\frac{1}{2}$ Hours   Max Marks: 50

PART-I

Answer **any Three** questions by attempting at least one question form each section 3 X 10= 30 Marks

SECTION-A

1. Essay question from UNIT- I

2. Essay question from UNIT- I

3. Essay question from UNIT- II

SECTION-B

4. Essay question from UNIT-III

5. Essay question from UNIT-IV

6. Essay question from UNIT- V

PART-II

Answer **any Four** Questions from the following   4 X 5= 20 Marks

7. Short answer question from UNIT - I

8. Short answer question from UNIT - II

9. Short answer question from UNIT - III

10. Short answer question from UNIT - IV

11. Short answer question from UNIT - IV

12. Short answer question from UNIT - V

13. Short answer question from UNIT - V

COURSE 3: Renewable Energy resources-1

Practical Credits: 1   2hrs/week

LIST OF EXPERIMENTS

Minimum of 6 experiments to be done and recorded

I-V Characteristics of Solar cell. fill factor.

2. P-V Characteristics of solar cell. Efficiency.

3. Spectral characteristics of solar cell

4. Intensity characteristics of solar cell

5. Area characteristics of solar cell

6. Effect of temperature on the efficiency of the solar cell.

7. Effect of tilt angle on the efficiency of the solar cell.

8. Determination of Planck's constant using photocell

Scheme of Evaluation for Practicals

Time: 2 hrs   Max.Marks:50

1. Formulae & Explanation   - 10 Marks
2. Tabular form + graph + circuit diagram   -10 Marks
3. Observations   - 10 Marks
4. Calculation, graph, precaution and results - 10 Marks
5. Viva Voce   -5 Marks
6. Record   - 5 Marks

	Pithapur Rajahs Government College (Autonomous) Kakinada	Program & Semester W.e.f. 2023 - 24 ADMITTED BATCH			
Course 4 Code: RES2-24	**Renewable Energy resources-2**				
Teaching	Hours Allocated: 45 (**Theory**)	L	T	P	C
Pre-requisites:	Different Forms of Energy.	3	0	-	3

Theory Credits: 3   3hrs/week

UNIT-I(7hrs)

Global Energy Scenario: Energy demand and Energy Trilemma index, Indian Energy Scenario: Energy resources available in India, Governance of energy sector in India, National Green Tribunal (NGT)act, NGT activities.

UNIT-II(7hrs)

Geothermal energy: Origin of geothermal energy, Types of geothermal resources and basic extraction mechanisms-Hydrothermal Resources, Geo-pressured resources, Hot dry rock resources, Magma resources. (BH Khan Chapter 9)

UNIT-III(10hrs)

Introduction to Hydropower, Hydrology – descriptive hydrology, hydro graph, mass curve, storage, dams. Classification of Hydropower Plants, Small Hydropower, Systems: Overview of micro, mini and small hydro systems Status of Hydropower Worldwide Advantages and Disadvantages of Hydropower, Selection of site for hydroelectric plant, Hydrological cycle, Essential elements of a hydroelectric power plant.

UNIT-IV(10hrs)

Radioactivity; Mass defect and binding energy; Chain reaction; Materials used in nuclear plants; Classifications of nuclear reactors, Construction and working of conventional nuclear reactor, pressurized water reactor, boiling water reactor, supercritical water reactor, Fast breeder reactor-types, Gas cooled reactor-types, Nuclear fusion reactor schematic, Nuclear power plant.

UNIT-V(11 hrs)

Environmental Effects :Environmental degradation due to energy production and utilization, air and water pollution, depletion of ozone layer, global warming, biological damage due to environmental degradation.

Environmental effects of thermal power station, Geothermal power, Ocean energy harvesting. Wind energy harvesting, Solar energy harvesting, Bioenergy.(Frank R Spellman)

https://sci-hub.ru/10.1016/b978-0-08-098330-1.00017-x and Wikipedia

https://libgen.rs/scimag/?q=nuclear+power+paul+breeze

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A) KAKINADA.

II B.Sc., Physics-Semester – II, Paper – III

Renewable Energy resources-2
w.e.f. 2021-22 ADMITTED BATCH

Course Code: **No. of Credits: 04**

Answer **ANY THREE** questions by choosing at least one from each Section

Section	Questions to be given	Questions to be answered	Marks
A	6	3	3 x 10M = 30M
B	7	4	4 x 5 M = 20M
Total	13	7	50M

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
I			
II			
III			
IV			
V			
			95

Percentage of Choice $= \dfrac{(95-50)}{95}$ **X 100 =** $\dfrac{45}{95}$ **x 100 = 47%**

PITHAPUR RAJAHS GOVERNMENT COLLEGE (A), KAKINADA

I B.Sc., SEMESTER–II   PAPER 4

W.e.f. 2023 - 24 ADMITTED BATCH

Renewable Energy resources-2

Course Code: No. of credits: 03 Hours/Week   **Total hours: 45hrs**

Note: -Set the question paper as per the blue print given at the end of this model paper.

Time: 2 $\frac{1}{2}$ Hours   Max Marks: 50

PART-I

Answer **any Three** questions by attempting at least one question form each section 3 X 10= 30 Marks

SECTION-A

3. Essay question from UNIT- I

4. Essay question from UNIT- I

14. Essay question from UNIT- II

SECTION-B

15. Essay question from UNIT-III

16. Essay question from UNIT-IV

17. Essay question from UNIT- V

PART-II

Answer **any Four** Questions from the following   4 X 5= 20 Marks

18.   Short answer question from UNIT - I

19.   Short answer question from UNIT - II

20.   Short answer question from UNIT - III

21. Short answer question from UNIT - IV

22. Short answer question from UNIT - IV

23. Short answer question from UNIT - V

24. Short answer question from UNIT - V

SEMESTER-II
COURSE 4: Renewable Energy resources-2
Practical Credits: 1   2hrs/week

Minimum of 6 experiments to be done and recorded

Experiments

. 1.Effect of wind speed on windmill efficiency.

2. Effect of tilt on wind mill efficiency.

3. Effect of water source height on turbine power generation.

4.Wind-rose analysis

https://www.climate.gov/maps-data/dataset/wind-roses-charts-and-tabular-data

https://www.wikihow.com/Read-a-Wind-Rose

5. Spectral analysis of intensities on selective absorbers in solar cookers.

6. Biomass conversion analysis

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9160279/

Scheme of Evaluation for Practicals

Time: 2hrs   Max.Marks:50

1. Formulae & Explanation   - 10 Marks
2. Tabular form + graph + circuit diagram   -10 Marks
3. Observations   - 10 Marks
4. Calculation, graph, precaution and results   - 10 Marks
5. Viva Voce   -5 Marks
6. Record   - 5 Marks

	Pithapur Rajahs Government College (Autonomous) Kakinada	Program & Semester III W.e.f. 2023 - 24 ADMITTED BATCH			
Course 5 Code : RESA24	**Renewable Energy Systems Analysis**				
Teaching	Hours Allocated: 45 (**Theory**)	L	T	P	C
Pre-requisites:	System analysis	3	0	-	3

Course - 5 Title: Renewable Energy Systems Analysis
Total Hours: 45
Chapter 1: Introduction to Renewable Energy Systems (8 hours)
Overview of renewable energy sources.Importance and benefits of renewable energy systems.
Basic principles of energy conversion: Introduction to energy conversion processes: conversion of one form of energy into another. Overview of energy conversion technologies used in renewable energy systems. Energy balance and system boundaries.

Chapter 2: Modeling Techniques for Renewable Energy Systems (10 hours)
Mathematical modeling of renewable energy sources.Simulation techniques and software tools.Data collection and analysis methods.Uncertainty and sensitivity analysis.

Chapter 3: Techno-Economic Analysis of Renewable Energy Systems (12 hours)
Cost-benefit analysis.Levelized cost of energy (LCOE).Financial metrics: NPV, IRR, ROI
Project feasibility assessment.Case studies and real-world examples.

Chapter 4: Optimization Methods for Renewable Energy Systems (8 hours)
Optimization techniques: linear programming, nonlinear optimization.Multi-objective optimization.Optimization algorithms and software applications.Design optimization for renewable energy systems

Chapter 5: Case Studies and Applications (7 hours)
Analysis of real-world renewable energy systems.Case studies in solar PV, wind, hydro, biomass, etc.Performance evaluation and improvement strategies.Policy implications and regulatory considerations.
Reference Books:
1.   "Renewable and Efficient Electric Power Systems" by Gilbert M. Masters
2.   "Renewable Energy Systems: A Smart Energy Systems Approach to the Choice and Modeling of 100% Renewable Solutions" by Henrik Lund.
3.   "Modeling and Simulation of Renewable Energy Systems" by David W. Wood
4.   "Renewable Energy Systems: Simulation with Simulink® and Sim Power SystemsTM" by Viktor Perelmuter
5.   "Renewable Energy Finance: Powering the Future" by Charles W. Donovan
6.   "Renewable Energy: Power for a Sustainable Future" by Godfrey Boyle
7.   "Optimization of Renewable Energy Systems: A Review" by Petros Aristidou et al.
8.   "Renewable Energy System Design" by Ziyad Salameh
9.   "Renewable Energy Systems: The Choice and Modeling of 100% Renewable Solutions" by Henrik Lund
10.   "Renewable Energy Systems: Engineering, Analysis, and Sustainability" by Gary D. Price and Robert A. Fleming

https://www.youtube.com/watch?v=JgNpfs6IRTA

EE8712   RENEWABLE ENERGY SYSTEMS   L   T   P   C
                          LABORATORY   0   0   4   2

OBJECTIVES:
- To train the students in Renewable Energy Sources and technologies.
- To provide adequate inputs on a variety of issues in harnessing Renewable Energy.
- To recognize current and possible future role of Renewable energy sources.

LIST OF EXPERIMENTS
1. Simulation study on Solar PV Energy System.
2. Experiment on "VI-Characteristics and Efficiency of 1kWp Solar PV System".
3. Experiment on "Shadowing effect & diode based solution in 1kWp Solar PV System".
4. Experiment on Performance assessment of Grid connected and Standalone 1kWp Solar Power System.
5. Simulation study on Wind Energy Generator.
6. Experiment on Performance assessment of micro Wind Energy Generator.
7. Simulation study on Hybrid (Solar-Wind) Power System.
8. Experiment on Performance Assessment of Hybrid (Solar-Wind) Power System.
9. Simulation study on Hydel Power.

S.No	Name of the Practical	Objective	Description	Software
1	Simulation of Solar PV Systems	Simulate the performance of a solar PV system.	Students will design a simple solar PV system, simulate its performance under various irradiance and temperature conditions, and analyze the output power.	PVsyst, MATLAB/Simulink
2	Wind Turbine Performance Simulation	Model and analyze the performance of a wind turbine.	Students will create a wind turbine model, simulate it under different wind speeds, and evaluate the power output and efficiency.	QBlade, MATLAB/Simulink
3	Biomass Energy Conversion Simulation	Simulate the conversion process of biomass to energy.	Students will model a biomass gasification process, simulate the energy output, and analyze the efficiency of the conversion process.	Aspen Plus
4	Hydroelectric Power Plant Simulation	Model a small hydroelectric power plant.	Students will design a hydroelectric power plant model, simulate its performance under different water flow rates, and analyze the generated power.	MATLAB/Simulink

5	Energy Storage System Simulation	Simulate an energy storage system integrated with renewable energy sources	Students will design and simulate an energy storage system (e.g., battery storage) connected to a renewable energy source and analyze the system's performance	HOMER Pro, MATLAB/Simulink
6	Techno-Economic Analysis of a Solar PV System	Perform a techno-economic analysis of a solar PV system.	Students will use software tools to perform a cost-benefit analysis, calculate the Levelized Cost of Energy (LCOE), and assess the financial viability of a solar PV project.	RETScreen, HOMER Pro
7	Optimization of Renewable Energy Systems	Optimize the design of a renewable energy system.	Students will apply optimization techniques to a renewable energy system (e.g., solar PV or wind turbine) to maximize efficiency or minimize costs.	GAMS, MATLAB
8	Simulation of Hybrid Renewable Energy Systems	Simulate a hybrid renewable energy system combining solar, wind, and storage.	Students will design and simulate a hybrid system, analyze the performance, and evaluate the system's reliability and cost-effectiveness.	HOMER Pro
9	Uncertainty and Sensitivity Analysis	Perform uncertainty and sensitivity analysis on a renewable energy project.	Students will analyze the impact of varying input parameters on the performance and economic feasibility of a renewable energy project.	Crystal Ball, MATLAB
10	Policy Impact Simulation on Renewable Energy Adoption	Simulate the impact of policy changes on renewable energy adoption.	Students will model and simulate the effect of different policy scenarios (e.g., subsidies, tax incentives) on the adoption rates of renewable energy technologies.	System Dynamics Software (e.g., Vensim)

Pithapur Rajah's Government College (Autonomous), Kakinada

II B.Sc., SEMESTER–III

W.e.f. 2023 - 24 ADMITTED BATCH

COURSE 1 BLUE PRINT

Course Code: RESA24   **No. of credits: 03 Hours/Week**   **Total hours: 60hrs**

No. of Credits: 04

Answer **ANY THREE** questions by choosing at least one from each Section

Section	Questions to be given	Questions to be answered	Marks
A	6	3	3 x 10M = 30M
B	7	4	4 x 5 M = 20M
Total	13	7	50M

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Problems 5 marks	Marks allotted
I	1	1	-	15
II	1	-	1	15
III	1	2	-	20
IV	2	-	1	25
V	1	1	1	20
Total Marks				**95**

$$\text{Percentage of Choice} = \frac{(95 - 50)}{95} \textbf{ X 100} = \frac{45}{95} \textbf{ x 100} = \textbf{47\%}$$

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A),

KAKINADA   II B.Sc., SEMESTER–III

W.e.f. 2023 - 24 ADMITTED BATCH

COURSE 5

Course Code: RESA24   No. of credits: 03   3Hours/Week   Total hours: 60hrs

Note: -Set the question paper as per the blue print given at the end of this model paper.

Time: 2 $\frac{1}{2}$ Hours   Max Marks: 50

PART-I

Answer **any Three** questions by attempting at least one question form each section 3 X 10= 30 Marks

SECTION-A

5. Essay question from UNIT- I

6. Essay question from UNIT- I

25. Essay question from UNIT- II

SECTION-B

26. Essay question from UNIT-III

27. Essay question from UNIT-IV

28. Essay question from UNIT- V

PART-II

Answer **any Four** Questions from the
following

4 X 5= 20 Marks

29.   Short answer question from UNIT - I

30.   Short answer question from UNIT - II

31.   Short answer question from UNIT - III

32. Short answer question from UNIT - IV

33. Short answer question from UNIT - IV

34. Short answer question from UNIT - V

35. Short answer question from UNIT - V

![college logo]	**Pithapur Rajahs Government College (Autonomous) Kakinada**	**Program & Semester III** W.e.f. 2023 - 24 ADMITTED BATCH			
Course 6 Code : RESEEP24	**Sustainable Energy and Environmental protection**				
Teaching	Hours Allocated: 45 (**Theory**)	L	T	P	C
Pre-requisites:	Different Forms of Energy.	3	0	-	3

Course - 6 Title: Sustainable Energy and Environmental protection

Total Hours: 45

Chapter 1: Energy for sustainability: (9 hours)

Energy and Civilization, Global Energy Supply and Consumption, Criteria for Sustainable Energy, The Environmental Limits of Fossil Fuels, types of mechanical energies, solar energy and solar spectrum, Some Fundamentals of Market Transformation

Chapter 2: The Challenges in crafting U.S. Energy Policy : (9 hours)

A Good Fuel for Generating Electricity, Understanding the Scale of Energy, The Function of Energy Policy, Factors Influencing U.S. Energy Use, The Threat of Climate Change, The Role of Technical Experts in Policy Making, Visible Lack of Consensus, Multiple Stakeholders.

Chapter 3: The Evolution of Environmental Policy and Politics (9 hours)

The Modern Environmental Movement and Policy Achievements, Public Opinion and the Environment, Environmental Issues in Election Campaigns, The History of U.S. Energy Policy since 1945, The Climate Change Challenge, Changing Energy Investment Strategies.

Chapter 4: Energy systems and Sustainability Metrics: (9 hours)

Introduction and Historical Notes, Life-cycle analysis, Simulation models, General indicators of sustainability, Drivers of Societal Change, Some General Principles of Sustainable Development.

Chapter 5: Environmental Protection Policy: (9 hours)

The Clean Air Act, The Clean Water Act, The Safe Drinking Water Act, Setting Environmental Standards,

Balancing Statutory Goals and Costs, Setting Quality Standard.

Reference Books:

1. "Energy Policy in the U.S.: Politics, Challenges, and Prospects for Change" by Marilyn A. Brown and Benjamin K. Sovacool

2. "Sustainable Energy: Choosing Among Options" by Jefferson W. Tester et al.

3. "Energy Poverty: Global Challenges and Local Solutions" by Antoine Halff et al.

4. "Energy and Human Development" by Tariq Banuri and Juliet B. Schor

5. "Climate Change and Energy Insecurity: The Challenge for Peace, Security and Development" by Felix Dodds et al.

6. " Energy for sustainability" John Randolph and Gilbert M. Masters

7. "Energy Justice: Rebalancing the Trilemma of Security, Poverty, and Climate Change" by Darren McCauley

8. "Social Policies and Programs on Sustainable Energy: Implementation and Outcomes" edited by Pedro Ramos and Manuel Pérez Henríquez

9. "Policy Instruments for Sustainable Energy Transition: A Framework for Analysis" by Ivetta Gerasimchuk et al.

10. "Energy Policy Making in the EU: Building the Agenda" by Per Olof Busch and Dominique Finon

Pithapur Rajah's Government College (Autonomous), Kakinada

II B.Sc., SEMESTER–III

W.e.f. 2023 - 24 ADMITTED BATCH

COURSE 6 BLUE PRINT

Course Code: RESEEP24 **No. of credits: 03 Hours/Week Total hours: 60hrs**

No. of Credits: 04

Answer **ANY THREE** questions by choosing at least one from each Section

Section	Questions to be given	Questions to be answered	Marks
A	6	3	3 x 10M = 30M
B	7	4	4 x 5 M = 20M
Total	13	7	50M

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Problems 5 marks	Marks allotted
I	1	1	-	15
II	1	1	1	15
III	1	2	-	20
IV	2	1	1	25
V	1	2	1	20
Total Marks				**95**

Percentage of Choice $= \dfrac{(95-50)}{95}$ **X 100 =** $\dfrac{45}{95}$ **x 100 = 47%**

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A),

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W.e.f. 2023 - 24 ADMITTED BATCH

COURSE 6

Course Code: RESEEP24   No. of credits: 03   3Hours/Week   Total hours: 60hrs

 Note: -Set the question paper as per the blue print given at the end of this model paper.

Time: 2 $\frac{1}{2}$ Hours   Max Marks: 50

PART-I

Answer **any Three** questions by attempting at least one question form each section 3 X 10= 30 Marks

<u>SECTION-A</u>

1. Essay question from UNIT- I

2. Essay question from UNIT- II

3. Essay question from UNIT- II

     <u>SECTION-B</u>

4. Essay question from UNIT-III

5. Essay question from UNIT-IV

6. Essay question from UNIT- V

Answer **any Four** Questions from
the
following

4 X 5= 20 Marks

7. Short answer question from
   UNIT - I

8. Short answer question from
   UNIT - II

9. Short answer question from
   UNIT - III

10. Short answer question from
    UNIT - III

11. Short answer question from
    UNIT - IV

12. Short answer question from
    UNIT - V

13. Short answer question UNIT-V

          c.) Coal

          d.) Camphor

3. Study of energy investment

          a.) Hydro power

          b.) Solar energy

          c.) Wind energy

          d.) Biomass energy

4. Air quality measurement experiment using indoor air quality mea

   in different conditions.

5. TDS measurement of different sources of water and identifying b

6. Identifying Simulation models for solar energy experiments

7. Identifying Simulation models for Wind energy experiments

**Course 6 : Sustainable Energy and
        Environmental protection**

List of Experiments

1. Identifying the energy efficient household items

   a.) Incandescent bulb

   b.) Fluorescent tube light

   c.) LED bulb

   d.) CFL bulb

2. Identifying the high energy value fuel

   a.) Petrol

   b.) Diesel

Sustainable Energy and Environmental protection Lab

S.No	Name of the Practical	Objective	Description	Equipment required
1	Identifying the energy efficient household items	To identify the bulb which consumes less power for the same intensity of light	Study the Power consumption for incandescent bulb , CFL and Fluorescent Lamps and LED	Digital Multimeter, and Bulbs
2	Identifying the high energy value fuel	To calculate the high calorific value of different fuels	Students will identify high calorific value fuel among petrol, coal, camphor, and any other fuel.	Joule's calorimeter Mercury thermometer connecting wire and multimeter
3	Study of energy investment	To know the right investment for house hold electrical energy	Students will collect cost estimation for different types of energies like solar, wind and hydro power etc.. and will analyse the expenditure for longer period and will find out the best one.	Collect estimation forms for solar energy, wind energy and Grid
4	Air quality measurement experiment	To study the quality of air in different surroundings	Students will measure the PPM values for different surroundings and estimate its quality	PPM meter and air quality analyzer
5	TDS measurement of different sources of water	To study the TDS levels in Municipal water, RO water and dirt water	Students will collect water from Municipality and RO plants and agriculture sewage	TDS meter , test tube and water collection beaker
6	Identifying Simulation models for solar energy experiments	Perform a techno-economic analysis of a solar PV system.	Students will use software tools to perform VI characteristics and other parameters which influence the performance of a solar panel	Desktop computer for Simulation Lab
7	Identifying Simulation models for Wind energy experiments	Optimize the design of a wind turbine system.	Students will apply optimization techniques to a renewable energy system (e.g., solar PV or wind turbine) to maximize efficiency or minimize costs.	GAMS, MATLAB

	Pithapur Rajahs Government College (Autonomous) Kakinada	**Program & Semester III** W.e.f. 2023 - 24 ADMITTED BATCH			
Course 7 Code : REWO24	**Waves and Oscillations**				
Teaching	Hours Allocated: 45 (**Theory**)	L	T	P	C
Pre-requisites:	Different Forms of Energy.	3	0	-	3

COURSE OBJECTIVE:

This course provides students with a broad understanding of the physical principles of the oscillations, to help them develop critical thinking and quantitative reasoning skills, to empower them to think creatively and critically about scientific problems and experiments.

LEARNING OUTCOMES:

The student should be able

1. To describe the basic characteristics of waves such as frequency, wavelength, amplitude, period, and speed.
2. To utilize mathematical relationships related to wave characteristics.
3. To compare particle motion and wave motion in different types of waves.
4. To distinguish between Longitudinal and Transverse waves.
5. To get the knowledge about how to construct and analysis the square waves, saw tooth waves, etc. from Fourier analysis

UNIT-I Simple Harmonic oscillations

Simple harmonic oscillator and solution of the differential equation-Physical characteristics of SHM, torsion pendulum-measurements of rigidity modulus, compound pendulum- measurement of 'g', Principle of superposition, beats, combination of two mutually perpendicular simple harmonic vibrations of same frequency and different frequencies. Lissajous figures.

UNIT-II Damped and forced oscillations

Damped harmonic oscilator, solution of the differential equation of damped oscillator. Energy considerations, comparison with un-damped harmonic oscillator, logarithmic decrement, relaxation time, quality factor, differential

equation of forced oscillator and its solution, amplitude resonance and velocity resonance.

UNIT-III Complex vibrations 9hr

Fourier theorem and evaluation of the Fourier coefficients, analysis of periodic wave functions-square wave, triangular wave, saw tooth wave, simple problems on evolution of Fourier coefficients.

UNIT-IV Vibrating Strings and Bars

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. Energy

transport and transverse impedance. Longitudinal vibrations in bars-wave equation and its general solution. Special cases (i) bar fixed at both ends (ii) bar fixed at the midpoint (iii) bar fixed at one end. Tuning fork.

UNIT-V Ultrasonics:

Ultrasonics, properties of ultrasonic waves, production of ultrasonics by piezoelectric and magneto strictive methods, detection of ultrasonics, determination of wavelength of ultrasonic waves. Applications and uses of ultrasonic waves.

REFERENCE BOOKS:

1. BSc Physics Vol.1, Telugu Academy, Hyderabad.

2. Fundamentals of Physics. Halliday/Resnick/Walker ,Wiley India Edition 2007.

3. Waves & Oscillations. S.Badami, V. Balasubramanian and K.R. Reddy, Orient Longman.

4. College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House.

5. Science and Technology of Ultrasonics- Baldevraj, Narosa, New Delhi,2004

6. Introduction to Physics for Scientists and Engineers. F.J. Buche. McGraw Hill.

Pithapur Rajah's Government College (Autonomous), Kakinada
II B.Sc., SEMESTER–III
W.e.f. 2023 - 24 ADMITTED BATCH
COURSE 7 BLUE PRINT

Course Code: REWO24   **No. of credits: 03 Hours/Week**   **Total hours: 60hrs**

No. of Credits: 04

Answer **ANY THREE** questions by choosing at least one from each Section

Section	Questions to be given	Questions to be answered	Marks
A	6	3	3 x 10M = 30M
B	7	4	4 x 5 M = 20M
Total	13	7	50M

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Problems 5 marks	Marks allotted
I	1	1	-	15
II	1	-	1	15
III	1	2	-	20
IV	2	-	1	25
V	1	1	1	20
Total Marks				**95**

$$\text{Percentage of Choice} = \frac{(95-50)}{95} \textbf{ X 100} = \frac{45}{95} \textbf{ x 100} = \textbf{47\%}$$

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A),

KAKINADA   II B.Sc., SEMESTER–III

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COURSE 7

Course Code: REWO24   **No. of credits: 03   3Hours/Week   Total hours: 60hrs**

Note: -Set the question paper as per the blue print given at the end of this model paper.

Time: 2 $\frac{1}{2}$ Hours   Max Marks: 50

PART-I

Answer **any Three** questions by attempting at least one question form each section 3 X 10= 30 Marks

SECTION-A

- ➢ Essay question from UNIT- I
- ➢ Essay question from UNIT- II
- ➢ Essay question from UNIT- II

- ➢ Essay question from UNIT-III
- ➢ Essay question from UNIT-IV
- ➢ Essay question from UNIT- V

Answer **any Four** Questions from the following   4 X 5= 20 Marks

- ➢ Short answer question from UNIT - I
- ➢ Short answer question from UNIT - II
- ➢ Short answer question from UNIT - III
- ➢ Short answer question from UNIT - IV
- ➢ Short answer question from UNIT - V
- ➢ Problem from UNIT - I
- ➢   Problem from UNIT – III

Minimum of 6 experiments to be done and recorded

Experiments

1. Volume resonator experiment

2. Determination of 'g' by compound/bar pendulum

3. Simple pendulum normal distribution of errors-estimation of time period and the error of the mean by statistical analysis

4. Determination of the force constant of a spring by static and dynamic method.

5. Determination of the elastic constants of the material of a flat spiral spring.

6. Coupled oscillators

7. Verification of laws of vibrations of stretched string –sonometer

8. Determination of frequency of a bar –Melde's experiment.

9. Study of a damped oscillation using the torsional pendulum immersed in liquid-decay constant and damping correction of the amplitude.

10. Formation of Lissajous figures using CRO.

Scheme of Evaluation for Practicals

Time: 2hrs   Max.Marks:50

1. Formulae & Explanation   - 10 Marks
2. Tabular form + graph + circuit diagram   -10 Marks
3. Observations   - 10 Marks
4. Calculation, graph, precaution and results   - 10 Marks
5. Viva Voce   -5 Marks
6. Record   - 5 Marks

	Pithapur Rajahs Government College (Autonomous) Kakinada	Program & Semester III W.e.f. 2023 - 24 ADMITTED BATCH			
Course 8 Code : PH3202P	**Heat and Thermodynamics**				
Teaching	Hours Allocated: 45 (**Theory**)	L	T	P	C
Pre-requisites:	Different Forms of Energy.	3	0	-	3

COURSEOBJECTIVE:

Eunderstandingof the principles of heat and energy transfer and their applications in various fields

Learning outcomes of the Subject:

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

- Understand the basic aspects of kinetic theory of gases, Maxwell-Boltzmann 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.

	On Completion of the course, the students will be able to-	Cognitive Domain
CO1	Students would learn about Kinetic Theory of gases, Maxwell's law of distribution of molecular velocities and its experimental verification, Mean free path, Degrees of freedom, Transport phenomenon viscosity, Thermal conductivity and diffusion of gases	Understanding & Remembrance
CO2	Students would learn about Various thermodynamic processes, entropy changes in various processes and heat engines.	Application
CO3	Students would learn about various thermodynamic potentials and joule kelvin cooling concepts using thermodynamic potentials.	Analyzation
CO4	Students would learn about Blackbody and its spectral energy distribution of black body radiation, Various theories of Black body radiation, usage of various radiation measuring instruments.	Application

Skill Development	■	Employability	■	Entrepreneurship	■

CO-PO Mapping

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-': No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	3	3	3	1	2	2	3	2	3	2	3
CO2	3	2	3	3	2	3	3	1	3	3	3	2	1	2
CO3	2	3	2	3	2	3	2	2	2	3	2	2	3	3
CO4	3	2	3	2	2	2	3	3	1	1	3	1	2	1

PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A)Kakinada.

II B.Sc., Renewable Energy-Semester – III

Course 8

Heat and Thermodynamics

Course Code: PH3202P   **No. of credits: 04**

w.e.f. 2020-21 ADMITTED BATCH

<u>Hours/Week</u> 4[<u>Total:</u> 60hrs.]

UNIT I: Kinetic Theory of Gases: (12 hrs.)

Kinetic Theory of gases- Introduction, Maxwell's law of distribution of molecular velocities, Mean free path, Principle of equipartition of energy, Transport phenomenon in ideal gases: viscosity and Thermal conductivity.

UNIT II: Thermodynamics: (12hrs)

Introduction- Reversible and irreversible processes, Carnot's engine and its efficiency, Carnot's theorem, Thermodynamic scale of temperature, Second law of thermodynamics Entropy: Physical significance, Change in entropy in reversible and irreversible processes; 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- Clapeyron's equation (ii) Value of C_P - C_V (iii) Value of C_P/C_V (iv) Joule- Kelvin coefficient for ideal 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, Joule Thomson cooling, Production of low temperatures by adiabatic demagnetization (qualitative)

UNIT V: Quantum theory of radiation: (12 hrs.) Spectral energy distribution of black body radiation, Wein's displacement 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 pyro heliometer, Estimation of surface temperature of Sun.

Reference books:

1. BSc Physics, Vol.2, Telugu Akademy, Hyderabad

2. Thermodynamics, R.C.Srivastava, S.K.Saha & Abhay K.Jain, Eastern Economy Edition.

3. Unified Physics Vol.2, Optics & Thermodynamics, Jai Prakash Nath & Co. Ltd., Meerut

4. Fundamentals of Physics. Halliday/Resnick/Walker. C. Wiley India Edition 2007

5. Heat and Thermodynamics -N BrijLal, P Subrahmanyam, S.Chand& Co.,2012

6. Heat and Thermodynamics- MS Yadav, Anmol Publications Pvt. Ltd, 2000

7. University Physics, HD Young, MW Zemansky,FW Sears, Narosa Publishers, New Delhi

Weblinks:

1. https://ocw.mit.edu/courses/physics/8-02-physics-ii-electricity-and-magnetism-spring-2007

2. http://physics.bu.edu/~duffy/classroom.html

3. https://nptel.ac.in/courses/115/106/115106122/

Pithapur Rajah's Government College (Autonomous), Kakinada

II B.Sc., SEMESTER–III

W.e.f. 2023 - 24 ADMITTED BATCH

COURSE 8 BLUE PRINT

Course Code: PH3202P   **No. of credits: 03 Hours/Week**   **Total hours: 60hrs**

No. of Credits: 04

Answer **ANY THREE** questions by choosing at least one from each Section

Section	Questions to be given	Questions to be answered	Marks
A	6	3	3 x 10M = 30M
B	7	4	4 x 5 M = 20M
Total	13	7	50M

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Problems 5 marks	Marks allotted
I	1	1	-	15
II	1	-	1	15
III	1	2	-	20
IV	2	-	1	25
V	1	1	1	20
Total Marks				**95**

Percentage of Choice $= \dfrac{(95-50)}{95}$ **X 100 =** $\dfrac{45}{95}$ **x 100 = 47%**

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A),

KAKINADA   II B.Sc., SEMESTER–III

W.e.f. 2023 - 24 ADMITTED BATCH

COURSE 8

Course Code: **No. of credits: 03   3Hours/Week**   **Total hours: 60hrs**

Note: -Set the question paper as per the blue print given at the end of this model paper.

Time: $2\frac{1}{2}$ Hours   Max Marks: 50

PART-I

Answer **any Three** questions by attempting at least one question form each section 3 X 10= 30 Marks

SECTION-A

- ➤ Essay question from UNIT- I
- ➤ Essay question from UNIT- II
- ➤ Essay question from UNIT- II

Section-B

- ➤ Essay question from UNIT-III
- ➤ Essay question from UNIT-IV
- ➤ Essay question from UNIT- V

PART-I

Answer **any Four** Questions from the following   4 X 5= 20 Marks

- ➤ Short answer question from UNIT - I
- ➤ Short answer question from UNIT - II
- ➤ Short answer question from UNIT - III
- ➤ Short answer question from UNIT - IV
- ➤ Short answer question from UNIT - V
- ➤ Problem from UNIT – I
- ➤ Problems from UNIT – V

	Pithapur Rajah's Government College (Autonomous) Kakinada	**Program & Semester** II B.Sc. (III Sem) **w.e.f. 2020-21 ADMITTED BATCH**			
Course 8 Course Code **PH3202P**	**Heat and Thermodynamics Lab**				
Teaching	Hours Allocated: 30 (**Practical**)	L	T	P	C
Pre-requisites:	Voltmeter, Ammeter, Rheostat, steam generators, Thermometer types.	0	0	2	1

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. Thermo emf- 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.

	Pithapur Rajahs Government College (Autonomous) Kakinada	Program & Semester IV W.e.f. 2023 - 24 ADMITTED BATCH			
Course 09 Code : REEDC-24	**ELECTRONIC DEVICES AND CIRCUITS**				
Teaching	Hours Allocated: 45 (**Theory**)	L	T	P	C
Pre-requisites:	Different Forms of Energy.	3	0	-	3

B.Sc. (HONOURS) RENEWABLE ENERGY SINGLE MAJOR
SYLLABUS UNDER CBCS
w.e.f. 2023-24 (Revised in May 2023)
SEMESTER-IV
COURSE 9: ELECTRONIC DEVICES AND CIRCUITS
Hours: 45   Credits: 3   3 hrs/week

COURSE OBJECTIVE:

The course on Electronic Devices and Circuits aims to provide students with a fundamental understanding of electronic devices and their applications in various circuits.

LEARNING OUTCOMES:

1. Understand the behavior of P-N junction diodes in forward and reverse bias conditions and analyze the impact of junction capacitance on diode characteristics.

2. Analyze and compare the characteristics and operation of different BJT configurations (CB, CE, and CC) and demonstrate proficiency in biasing techniques.

3. Comprehend the operation and characteristics of FETs, including JFETs and MOSFETs, and explain the working principles and characteristics of UJTs.

4. Describe the operation and applications of various photoelectric devices such as LEDs, photo diodes, phototransistors, and LDRs.

5. Understand the operation of rectifiers (half-wave, full-wave, and bridge), analyze the ripple factor and efficiency, and demonstrate knowledge of different filter types and three-terminal voltage regulators

UNIT I: PN JUNCTION DIODES

P-N junction Diode, Formation of depletion region, Forward and Reverse bias Ideal Diode, Diode equation – Reverse saturation current – Tunnel Diode- Construction, working, V-I characteristics and Applications, Zener diode – V I characteristics, Applications

UNIT –II: BIPOLAR JUNCTION TRANSISTOR AND ITS BIASING: (D.C)

Transistor construction, working of PNP and NPN Transistors, Active, Cutoff and Saturation conditions, Configurations of Transistor - CB, CE, and CC, Input and Output Characteristics of CB and CE configurations. Hybrid parameters of a Transistor and equivalent circuit, BJT Transistor Biasing – Need for stabilization, Thermal runaway, Stability factor, Biasing methods - Voltage-Divider Bias.

UNIT-III: FIELD EFFECT TRANSISTORS & POWER ELECTRONIC DEVICES –

Difference between JFET and BJT, Construction and working of JFET, Drain and Transfer

Characteristics, MOSFET - Depletion-type, and Enhancement-Type MOSFETs. FET Biasing: Voltage Divider Biasing. UJT- Construction, working, V-I characteristics. SCR – Construction, Working and Characteristics

UNIT IV: PHOTO ELECTRIC DEVICES:

Light-Emitting Diodes (LEDs) - Construction, working, characteristics and Applications, IR Emitters, Photo diode - Construction, working characteristics and Applications, Phototransistors - Construction, working and characteristics, Applications, Structure and operation of LDR, Applications

UNIT-V: POWER SUPPLIES:

Rectifiers: Half wave, Full wave and bridge rectifiers - Efficiency (with derivations), ripple factor- Zener diode as Voltage Regulator, Filters- choke input (inductor), L-section, π-section filters. Three terminal fixed voltage IC-regulators (78XX and 79XX)

REFERENCE BOOKS:

1. Electronic Devices and Circuit Theory --- Robert L. Boylestad & Louis Nashelsky.

2. Electronic Devices and Circuits I – T.L.Floyd- PHI Fifth Edition

3. Integrated Electronics – Millmam & Halkias.

4. Electronic Devices & Circuits – Bogart.

5. Sedha R.S., A Text Book Of Applied Electronics, S.Chand & Company Ltd

Pithapur Rajah's Government College (Autonomous), Kakinada

II B.Sc., SEMESTER–IV

W.e.f. 2023 - 24 ADMITTED BATCH

COURSE 9 BLUE PRINT

Course Code: REEDC-24   **No. of credits: 03 Hours/Week**   **Total hours: 60hrs**

No. of Credits: 04

Answer **ANY THREE** questions by choosing at least one from each Section

Section	Questions to be given	Questions to be answered	Marks
A	6	3	3 x 10M = 30M
B	7	4	4 x 5 M = 20M
Total	13	7	50M

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Problems 5 marks	Marks allotted
I	1	1	-	15
II	1	-	1	15
III	1	2	-	20
IV	2	-	1	25
V	1	1	1	20
Total Marks				**95**

Percentage of Choice $= \dfrac{(95-50)}{95}$ **X 100 =** $\dfrac{45}{95}$ **x 100 = 47%**

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A),

KAKINADA   II B.Sc., SEMESTER–IV

W.e.f. 2023 - 24 ADMITTED BATCH

COURSE 9

Course Code: REEDC-24   No. of credits: 03   3Hours/Week   Total hours: 60hrs

Note: -Set the question paper as per the blue print given at the end of this model paper.

Time: 2 ½ Hours   Max Marks: 50

PART-I

Answer **any Three** questions by attempting at least one question form each section3 X 10= 30 Marks

SECTION-A

- ➢ Essay question from UNIT- I
- ➢ Essay question from UNIT- II
- ➢ Essay question from UNIT- II

- ➢ Essay question from UNIT-III
- ➢ Essay question from UNIT-IV
- ➢ Essay question from UNIT- V

Answer **any Four** Questions from the following   4 X 5= 20 Marks

- ➢ Short answer question from UNIT - I
- ➢ Short answer question from UNIT - II
- ➢ Short answer question from UNIT - III
- ➢ Short answer question from UNIT - IV
- ➢ Short answer question from UNIT - V
- ➢ Problem from UNIT - I
- ➢ Problem from UNIT – III

B.Sc. (HONOURS) RENEWABLE
ENERGY SINGLE MAJOR
SYLLABUS UNDER CBCS
w.e.f. 2023-24
SEMESTER-IV
PRACTICAL COURSE 9: ELECTRONIC DEVICES AND CIRCUITS
Hours: 30   Credits: 12 hrs/week

COURSE OBJECTIVE:

The course objectives for a practical course in Electronic Devices and Circuits might provide hands-onexperience with the fundamental principles of electronic devices and circuits.

LEARNING OUTCOMES:

1. Understand the principles of electronic devices and circuits and their applications in real-worldscenarios.
2. Analyze and design electronic circuits using diodes, transistors, and operational amplifiers.
3. Understand the importance of biasing and stability in electronic circuits and how to achieve them.
4. Develop the skills to design and analyze amplifier circuits and to understand the concept of feedbackand its application in electronic circuits.
5. Analyze and design simple oscillators, power supplies, and filters.
6. Gain hands-on experience with electronic test equipment such as multimeters, oscilloscopes, andfunction generators.
7. Develop skills in circuit construction, measurement, and testing.
8. Learn how to troubleshoot and diagnose electronic circuit problems.
9. Understand the safety procedures for working with electronic circuits and equipment.

Minimum of 6 experiments to be done and recorded

1. V-I Characteristics of junction diode

2. V-I Characteristics of Zener diode

3. Transistor characteristics – CB configuration

4. Transistor characteristics – CE configuration

5. FET input and output characteristics

6. UJT characteristics

7. LDR characteristics

8. Full wave and Bridge rectifier with filters

	P.R Government College (Autonomous) Kakinada	**Program & Semester**			
Course-10 Code: RESEA-24	**TITLE OF THE COURSE** Solar Energy and Applications -7B **(Skill Enhancement Course (Elective)**	II Year B. Sc Semester –IV			
Teaching	Hours Allocated: 60, Max.marks 50 (**Theory**)	L	T	P	C
Pre-requisites	Basic idea about Latitudes and Longitudes, Introduction to semiconductors, PN junction diode and its characteristics	4	-	-	4

Learning Outcomes: After successful completion of the course, the student will be able to explain skills related to call us culture through hands on experience

1. Understand testing procedures and fault analysis of thermal collectors and PV modules.
2. Comprehend applications of thermal collectors and PV modules.

COURSE OBJECTIVES

1. Learning various radiation measurements
2. Understanding various solar thermal collectors and Solar water heaters
3. Learning various types of solar cells and modules

COURSE OUTCOME

On Completion of the course, the students will be able to		cognitive domain
CO1	Understand Sun structure, forms of energy coming from the Sun and its measurement.	Understanding
CO2	Acquire a critical knowledge on the working of thermal and photovoltaic collectors	Remembering
CO3	Demonstrate skills related to callus culture through hands on experience	Applying
CO4	Understand testing procedures and fault analysis of thermal collectors and PV modules Comprehend applications of thermal collectors and PV modules.	Understanding& Analyzing

Course with focus on Employability / Entrepreneurship / Skill Developmentmodules

Skill Development		Employability		Entrepreneurship	

Syllabus:

TotalHours:90   Instruction hours 60,(Lab,FieldTraining,Unittestsetc.30Hours)

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. Pyro heliometer - 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, Evacuated tube collector, collector overall heat loss coefficient, Definitions of collector efficiency factor, collector heat-removal factor and collector flow factor, testing of flat-plate collector, solar water heating system, natural and forced circulation types. Concentrating collectors, Solar cookers, Solar dryers, Solar desalinator.

UNIT III: FUNDAMENTALS OF SOLAR CELLS   (10Hrs)

Semiconductor interface, Types, homo junction, hetero junction and Schottky barrier, advantages and drawbacks, Photovoltaic cell, equivalent circuit, output parameters, conversion efficiency, quantum efficiency, Measurement of I-V characteristics, series and shunt resistance, their effect on efficiency, Effect of light intensity, inclination and temperature on efficiency

UNIT IV: TYPES OF SOLAR CELLS AND MODULES   (10hrs)

Types of solar cells, Crystalline silicon solar cells, I-V characteristics, poly-Si cells, Amorphous silicon 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

UNIT V: SOLAR PHOTO VOLTAIC SYSTEMS   (10hrs)

Energy storage in PV systems, Energy storage modes, electrochemical storage, Batteries, Primary and secondary, Solid-state battery, Molten solvent battery, lead acid battery and dry batteries, Mechanical storage – Flywheel, Electrical storage –Super capacitor

CO – PO Mapping

1: Slight [Low]; 2: Moderate [Medium]; 3:Substantial [High]; '-': (NoCorrelation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	3	3	3	1	2	2	3	2	3	2	2
CO2	3	2	3	3	2	3	3	1	3	3	3	2	1	3
CO3	2	3	2	3	2	3	2	2	2	3	2	2	3	1
CO4	3	2	3	2	2	2	3	3	1	1	3	1	2	3

REFERENCESBOOKS:

1. Solar Energy Utilization by G. D. Rai Khanna Publishers

2. Solar Energy-Fundamentals, design, modeling 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.,

Weblinks

- https://courses.edx.org/c4x/DelftX/ET.3034TU/asset/solar_energy_v1.1.pdfhttps://www.sku.ac.ir/Datafiles/BookLibrary/45/John%20A.%20Duffie,%20Willia
- m%2 0A.%20Beckman(auth.)-Solar%20Engineering%20of%20Thermal%20Processes,%20Fourth%20Edition%20(2013).pdf

PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A) KAKINADA

Solar Energy and Applications

2023-24ADMITTED BATCH

Course Code: RESEA-24   **No. of credits: 04**

Note: -Set the question paper as per the blue print given at the end of this model paper.

Time: 2 Hrs.   Max. Marks: 50

Answer **ANY THREE** questions by choosing at least one from each Section

Section	Questions to be given	Questions to be answered	Marks
A	6	3	3 x 10M = 30M
B	7	4	4 x 5 M = 20M
Total	13	7	50M

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Problems 5 marks	Marks allotted
I	2	-	1	25
II	1	1	-	15
III	1	2	-	20
IV	1	2	-	20
V	1	1	-	15
Total Marks				**95**

$$\text{Percentage of Choice} = \frac{(95-50)}{95} \text{ X 100} = \frac{45}{95} \text{ x 100} = 47\%$$

II B.Sc Renewable Energy Semester –IV (Model Paper)

Solar Energy and Applications

2023-24 ADMITTED BATCH

Time: 2hrs   **Max. Marks: 50M**

Note:-Set the question paper as per the blue print given at the end of this model paper.

PART-I

Answer **any Three** questions by attempting at least one question form each section   3 X 10= 30 Marks

SECTION-A

1. Essay question from UNIT- I

2. Essay question from UNIT- II

3. Essay question from UNIT- II

SECTION-B

4. Essay question from UNIT-III

5. Essay question from UNIT-IV

6. Essay question from UNIT- V

PART-II

Answer **any Four** Questions from the following   4 X 5= 20 Marks

7. Problem from UNIT - I

8. Short answer question from UNIT - II

9. Short answer question from UNIT - III

10. Short answer question from UNIT - III

11. Short answer question from UNIT - IV

12. Short answer question from UNIT - IV

13. Short answer question from UNIT – V

	P.R Government College (Autonomous) Kakinada	**Program & Semester**			
Course-11 REESS-24	**TITLE OF THE COURSE Energy Storage Systems for Renewable Energy**	II Year B. Sc Semester –IV			
Teaching	Hours Allocated: 60, Max.marks 50 (**Theory**)	L	T	P	C
Pre-requisites	Flywheel, Electro chemical energy storage working principle, Charge storage device working principle	4	-	-	4

Course 11 Title: Energy Storage Systems for Renewable Energy (45 hours)

Unit 1: Introduction to Energy Storage Systems (8 hours)

Overview of energy storage importance in renewable energy systems, Principles of energy storage technologies, Types of energy storage systems: electrochemical, mechanical, thermal, etc., Comparison of energy storage technologies based on efficiency, cost, and scalability.

Unit 2: Batteries in Energy Storage (10 hours)

Fundamentals of battery technology and operation, Types of batteries used in energy storage: lead-acid, lithium-ion, flow batteries, etc., Battery management systems and safety considerations, Applications of batteries in renewable energy systems.

Unit 3: Pumped Hydro Storage and Compressed Air Energy Storage (9 hours)

Principles and operation of pumped hydro storage systems, Design considerations and efficiency of pumped hydro storage, Overview of compressed air energy storage (CAES) technology, Applications and benefits of pumped hydro and CAES in renewable energy integration

Unit 4: Flywheels and Super capacitors (7 hours)

Working principles of flywheel energy storage systems, Materials and design considerations for flywheels, Introduction to super capacitors and their advantages, Comparison of flywheels and super capacitors with other energy storage technologies

Unit 5: Grid Integration and Future Trends (11 hours)

Role of energy storage in grid stabilization and peak shaving, Challenges and opportunities in integrating energy storage into renewable energy systems, Market trends and policy implications for energy storage deployment, Emerging technologies and research directions in energy storage for renewable energy.

Reference books
1. "Energy Storage for Smart Grids: Planning and Operation for Renewable and Variable Energy Resources" by Pengwei Du and Hanchen Xu
2. "Battery Management Systems for Large Lithium-Ion Battery Packs" by Davide Andrea
3. "Pumped Storage Hydropower: A Manual of Rigorous Requirements" by Federal Energy Regulatory Commission, Office of Energy Projects
4. "Compressed Air Energy Storage: Theory, Constraints and Opportunities for Applications" by Andreas Zeiringer
5. "Flywheel Energy Storage for Dockside Technology Integration" by Joshua Vignona
6. "Supercapacitors: Materials, Systems and Applications" by François Béguin and Elzbieta Frackowia

CO – PO Mapping

7. 1: Slight [Low]; 2: Moderate [Medium]; 3:Substantial [High]; '-': (NoCorrelation)

8.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	3	3	3	1	2	2	3	2	3	2	2
CO2	3	2	3	3	2	3	3	1	3	3	3	2	1	3
CO3	2	3	2	3	2	3	2	2	2	3	2	2	3	1
CO4	3	2	3	2	2	2	3	3	1	1	3	1	2	3

PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A) KAKINADA

Solar Energy and Applications

2023-24ADMITTED BATCH

Course Code: REESS-24   **No. of credits: 04**

Note: -Set the question paper as per the blue print given at the end of this model paper.

Time: 2 Hrs.   Max. Marks: 50

Answer **ANY THREE** questions by choosing at least one from each Section

Section	Questions to be given	Questions to be answered	Marks
A	6	3	3 x 10M = 30M
B	7	4	4 x 5 M = 20M
Total	13	7	50M

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Problems 5 marks	Marks allotted
I	2	-	1	25
II	1	1	-	15
III	1	2	-	20
IV	1	2	-	20
V	1	1	-	15
Total Marks				**95**

$$\text{Percentage of Choice} = \frac{(95-50)}{95} \textbf{ X 100} = \frac{45}{95} \textbf{ x 100} = \textbf{47\%}$$

II B.Sc Renewable Energy Semester –IV (Model Paper)

Solar Energy and Applications

2023-24 ADMITTED BATCH

Time: 2hrs   **Max. Marks: 50M**

Note:-Set the question paper as per the blue print given at the end of this model paper.

PART-I

Answer **any Three** questions by attempting at least one question form each section   3 X 10= 30 Marks

SECTION-A

14. Essay question from UNIT- I

15. Essay question from UNIT- II

16.Essay question from UNIT- II

SECTION-B

17.Essay question from UNIT-III

18.Essay question from UNIT-IV

19.Essay question from UNIT- V

PART-II

Answer **any Four** Questions from the following   4 X 5= 20 Marks

20.   Problem from UNIT - I

21.   Short answer question from UNIT - II

22.   Short answer question from UNIT - III

23. Short answer question from UNIT - III

24. Short answer question from UNIT - IV

25. Short answer question from UNIT - IV

26. Short answer question from UNIT – V

Course 11: Energy Storage Systems for Renewable Energy
List of Experiments

1.) Study of charge and discharge characteristics of storage battery

2.) Study of charging and discharging behaviour of a capacitor

3.) Determination of efficiency of DC-DC converter

4.) Study of charging characteristics of a Ni-Cd battery using solar photovoltaic panel

5.) Performance estimation for a fuel cell

6.) Study of effect of temperature on the performance of fuel cell

OFFICE OF THE DEAN, ACADEMIC AFFAIRS

ADIKAVI NANNAYA UNIVERSITY

RAJAMAHENDRAVARAM

No. ANUR/DAA/PR Govt. College (A)/Sub. Experts/2021   Date: 22-10-2021

PROCEEDINGS OF THE VICE-CHANCELLOR

Sub:- ANUR- DAA – Nominated University Subject Experts for BOS – PR Govt. College (A), Kakinada – Orders - Issued.

Ref:- 1. Lr. dated 15.09.2021, from the Principal, PR Govt. College (A), Kakinada

2. Proc. No: ANUR/PRG College (A), KKD/UG BoS/2019/09, dated 19.03.2019

Read:- Note for Orders of the Vice-Chancellor dated 21.10.2021

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ORDERS

Having consider the request cited in the ref. 1, the Vice-Chancellor is pleased to order that the following members be nominated as University Subject Experts for UG Board of Studies of *PR Govt. College (A), Kakinada* for a period of three years from the date of the proceedings issued.

S.No.	UG Courses	Name of the Subject Expert
1	English	Dr. Prasanthi Sree, AKNU MNS Campus, Kkd, Ph No: 9848297555, sathupathi.sri@gmail.com
2	Hindi	Dr. N Venkata Ramana, SKBR College, Amalapuram, Ph. No: 9849373773
3	Telugu	Dr. P. Nagaraju, GDC, Palakollu, Ph.No: 9052038569, raju00517@gmail.com
4	Sanskrit	Dr. TGY Acharyulu, SKR Womens College, Rajahmundry, Ph. No: 9848628812
5	Mathematics	Dr. V. Anantha Lakshmi, Principal, GDC Pithapuram, Ph. No : 9963786386, ananthamaths@rediffmail.com
6	Statistics & Actuarial Sciences	Dr. D V Ramana Murthy, HoD of Statistics, SKVT College, Rajamahendravaram, Ph.No: 9949135864, drdvrmurthy@gmail.com
7	Chemistry & Analytical Chemistry	Dr. K. Jhansi Lakshmi, Principal, Ideal College of Arts & Sciences, KKD, Ph.No: 9441236409, jhansikalisindi@gmail.com
8	Physics & Electronics	Dr. Paul Diwakar, Sri CRR College (A), Eluru, 9985050696
9	Petro Chemicals	Dr. M Trinadh, Lecturer in Chemistry, Govt. College (A), Rajahmundry, Ph. No: 8639551783
10	Bio-Chemistry	Dr. M Suvarchala, Lecturer in home science, ASD women's Degree College, KKD, Ph. No: 9346512694, suvarchakamallela@gmail.com
11	Food Science	
12	Botany	Dr. J. Sujatha, Leturer in Botany, GDC Rjy, Ph.No: 9441050910, drjsuneetha@gcrjy.ac.in
13	Microbiology	Dr. D Aruna, Lecturer in Micro-biology, ASD Women's College, Kakinada, Ph. No: 9182525872
14	Zoology	Dr. B. Tejo Murthy, Lecturer in Zoology, GDC Yeleswaram, Ph. No: 9703799970, drmtm2011@gmail.com
15	Bio Technology	Dr. B. Nageswari, Lecturer in Biotechnology, GDC Rjy, Ph. No: 986621955

16	Commercial Aquaculture	Dr. P Ramamohana Rao, Aquaculture Consultant, KKD, Ph. No: 9885144557, asreenivasulu@gmail.com
17	Computer Science & Computer Applications	Mr. N. Naga Subrahmanyesweri, Lecturer in Computer Science, ASD Women's College, KKD, Ph. No: 9948438376, yesweri.velugu@asddgcw.ac.in
18	Commerce	Dr. K. Ratna Manikyam, Govt. College (A), RJY, Ph. No: 8919230362, drkrm@gcrjy.ac.in
19	Economics	Dr. D. V. Nageshwara Rao, Lecturer, GDC, RJY, Ph. No: 9490919676
20	History	Dr. B. Anjani Kumari, Lecturer in charge, GDC (W), Ph. No: 891989337
21	Philosophy	Dr. V. Venkatarao, Lecturer in Philosophy, MR College, Vijayanagaram, Ph. No: 9440096609
22	Political Science	Dr. Seetha Mahalaxmi, Lecturer in Political Science, GDC, RJY Ph. No: 9491011844
23	Journalism & Mass Communication	Prof. DVR Murthy, Dept. of Journalism & Mass Communication, Andhra University, Vishakapatnam, Ph. No: 9985051793, 9440974092
24	Horticulture	Dr. J. Sujatha, Lecturer in Botany, GDC, Rjy, Ph. No: 9441050910, drjsuneetha@gcrjy.ac.in
25	Pharmaceutical Chemistry	Dr. K. Deepthi, Asst. Professor, Dept. of Chemistry, AKNU, Rjy, Ph. No: 9985469607, deepthikorabandi@gmail.com

(BY ORDERS)

Dean 22/10/21
ACADEMIC AFFAIRS

To
The Principal, PR Govt. College (A), Kkd
PA to R
PS to VC,
OOF

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

LIST OF EXAMINERS/ PAPER SETTERS IN PHYSICS
2024-2025

S.No.	Name of the examiner	Subject	Name of the College
1	L. Malleswara Rao 9985137973	Physics	Y.N.College, Narsapur
2.	Dr. A. Nirmala Jyotsna 9490171202	Physics	St. Theresa College (W), Eluru
3	Dr.K .Srilatha	Physics	St.Theresa College (W), Eluru
4	K.AnandaRao	Physics	C.R.R. College (M), Eluru
5	K.B.S.Gopal	Physics	C.R.R. College (M),Eluru
6	P.P.Divakar	Physics	Y.V.N.R. GDC, Kaikaluru.
7	R.SuryanarayanaRaju	Physics	K.G.R.L.College , Bhimavaram
8	Smt.V.Vidyamallika	Physics	K.G.R.L.College , Bhimavaram
9	P.Rajyalakshmi	Physics	C.R.R. College (W), Eluru
10	K.Sireesha	Physics	C.R.R. College (W), Eluru
11	M.Jayalakshmi Devi	Physics	C.R.R. College (W), Eluru
12	N.S.Satyanarayana Murthy	Physics	S.K.B.R.College, Amalapuram
13	V.V.SubbaRao	Physics	S.K.B.R.College, Amalapuram
14	J.PrabhakaraRao	Physics	S.K.B.R.College, Amalapuram
15	S.V.KumaraSastry	Physics	S.K.B.R.College, Amalapuram
16	V.Radha Krishna	Physics	S.K.B.R.College, Amalapuram

17	K.SrinivasaRao	Physics	Govt. Deg.College,Razole
18	ValluriSrinivasaRao	Physics	Govt. College (W) Nidadavolu
19	E.NageswaraRao	Physics	Govt. College, Eleswaram
20	EsubBasha Sheik	Physics	Govt. College (A), RJY
21	P.S. Brahamachari	Physics	Govt. College , Tadepalligudem
22	K.Ganesh Kumar	Physics	Govt. College , Tadepalligudem
23	M.Sudhadhar	Physics	Govt. College (A), RJY
24	B.DurgaLakshmi	Physics	Govt. College (A), RJY
25	T.Y.H.A.G.Gandhi	Physics	Govt. College , Ravulupalem
26	P. Rama Krishna Rao	Physics	Y.N. College (A), Narasapur
27	D. Gangadharudu	Physics	M.R. College, Peddapuram
28	A.Satyanarayana Murthy	Physics	M.R. College, Peddapuram
29	N. Veer Kumar	Physics	M.R. College, Peddapuram
30	S. Rama Rao	Physics	M.R. College, Peddapuram
31	Smt. M. Satyavani	Physics	D.N.R. College (A), Bhimavaram
32	M.V.S. Prasad	Physics	D.N.R. College (A), Bhimavaram
33	Smt. N. Udaya Sri	Physics	D.N.R. College (A), Bhimavaram
34	A. Veeraiah	Physics	D.N.R. College (A), Bhimavaram
35	N. Srinivasarao	Physics	Govt. College , Tadepalligudem
36	K.Srinivasa Rao	Physics	GDC, Mandapeta

Action Plan - 2024-25

The department of Physics and Electronics is planning to conduct the following programs for the academic year 2024-25

S.No.	Activity	Probable date to be conducted	Remarks
1	Student Counseling Discussion on Result Analysis	Sept 3rd week	
2	Sensitization on Departmental Activities particularly on Kasarabada Scholarship and Endowment Prizes	Oct 2th week	
3	**Parent -Teacher meeting**	Nov 1st week	
4	Disbursement of Kasarabada Scholarship both for UG and PG	Nov 2nd week	
5	Celebration of Birth day of Sir C.V.Raman	7.11.2024	
6	Guest Lecture -1	Nov3rd week	
7	Launching Upkar Scheme	Nov4th week	
8	Extension activity – **Open Lab for School students**	Dec 2nd week	
9	Awareness programme on IMD	Dec3rd week	
10	Guest Lecture -2	Jan 3rd week	
11	Study Area Programme/ CSP	Jan4th week	
12	Workshop / Intercollegiate Science Competitions	February 2nd week	
13	**National Science day celebrations**	**28.02.2025**	
14	Student Counseling before commencement of semester end exams	Feb 4th week	
15	Guest Lecture - 3	Mar 2nd week	
16	Parent Teacher Meeting	April 1st week	
17	Online Quiz programme	May 1st week	
18	Field visit	Jun 2nd week	
19	Guest Lecture - 4	July 1st week	

20	Observing World Chess Day	20.07.2023	
21	Parent Teacher Meeting	Aug 1st week	
22	Observing Hiroshima/ Nagasaki Day	6.8.2023/ 9.08.2023	
23	UPKAR scheme – Disbursement of scholarships to the students	August 3rd week	
24	Observing World Ozone Day	16.09.2023	

P. R. GOVERNMENT COLLEGE (A), KAKINADA
Department of Physics & Electronics

Budget Proposal for the Academic Year 2024-25

S.No.	PURPOSE	EXPENDITURE ESTIMATED	REMARKS
1.	Upgradation of 1st year Lab	Rs. 1,00,000=00	
2.	Upgradation of 2nd year Lab and dark room	Rs. 1,00,000=00	
3.	Upgradation of final year Lab	Rs1,00,000=00	
4.	Requirement of Lab Equipment for V-SEM papers	Rs. 1,00,000=00	
5. `	Research Materials and Characterization Devices for Research lab	Rs. 3,00,000=00	
6.	Student projects/Educational Tour	Rs. 1,00,000=00	
.	National level Activity	Rs. 1,50,000=00	
8.	Departmental Activities@ National Sc.Day, Guest Lectures, Inter collegiate competitions	Rs.1,00,000=00	
9.	Miscellaneous@Stationery,Maintenance of Laboratories etc.	Rs. 50,000=00	
	TOTAL:	Rs. 11,00,000=00	

Budget Estimated Rupees Eleven Lakhs only.

ANDHRA PRADESH STATE COUNCIL OFHIGHER EDUCATION

Assessment methodology for Internships / On the Job Training / Apprenticeship under the revised CBCS (2020 – 21 onwards)

First internship (After 1st year examinations): Community Service Project

To inculcate social responsibility and compassionate commitment among the students, the summer vacation in the intervening 1st and 2nd years of study shall be for Community Service Project.

Learning outcomes:

- To facilitate an understanding of the issues that confronts the vulnerable /marginalized sections of the society.
- To initiate team processes with the student groups for societal change.
- To provide students an opportunity to familiarize themselves with urban / ruralcommunity they live in.
- To enable students to engage in the development of the community.
- To plan activities based on the focused groups.
- To know the ways of transforming the society through systematicprogramme implementation.

Assessment Model:

There will be only internal evaluation for this internship. Each faculty member is to be assigned with 10 t0 15 students depending upon availability of the faculty members. The faculty member will act as a faculty-mentor for the group and is in- charge for the learning activities of the students and also for the comprehensive andcontinuous assessment of the students.

The assessment is to be conducted for 100 marks. The number of credits assigned is 4. Later as per the present practice the marks are converted into grades and grade points to include finally in the SGPA and CGPA.

Each student is required to maintain an individual logbook, where he/she is supposed to record day to day activities. The project log is assessed on an individual basis, thus allowing for individual members within groups to be assessed this way. The assessment will take into consideration the individual student's involvement in the assigned work.

While grading the student's performance, using the student's project log, the following should be taken into account -

a. The individual student's effort and commitment.

b. The originality and quality of the work produced by the individual student.

c. The student's integration and co-operation with the work assigned.

d. The completeness of the logbook.

The assessment for the ***Community Service Project implementation*** shall include the following components and based on the entries of Project Log and Project Report:

a. Orientation to the community development

b. Conducting a baseline assessment of development needs

c. Number and Quality of Awareness Programmes organised on beneficiary programmes and improvement in quality of life, environment and social consciousness, motivation and leadership, personality development, etc.

d. Number Quality and Duration of Intervention/service Programmes (Prevention or promotion programs that aim to promote behavioural change in defined community contexts to address social problems) organised.

e. Follow up Programmes suggested (Referral Services, Bringing Community Participation)

f. Developing short and mid-term action plans in consultation with local leadership and local government officers.

The **Project Report** should contain

a) Introduction, scope, objectives, and methodology

b) Project specifications (area / background of the work assigned).

c) Problems identified.

d) Analyses of the problems

e) Community awareness programmes conducted w.r.t the problems and their outcomes.

f) Intervention/service programmes taken up

g) Short-term and long term action plan for implementation

h) Recommendations and conclusions.

i) References

The **Project Presentation** is to be made by the student after he/she reports back to the College. The components for assessment are –

a.   assessing the involvement in the project
b.   presentation skills
c.   final outcome of the project as evinced by the student.

For Example:

II MPC-EM

S.No.	Name of the Student	Class & Year of Study	Register Number	Project Log	Project Implementation	Project Report	Presentation	Total
				(20)	(30)	(25)	(25)	(100)

Signature of   **Signature of**   **Signature of**
Project Mentor   **Nominated faculty**   **HOD/ In-Charge**

Pithapur Rajah's Government College (A),Kakinada

Department of Physics & Electronics

Subject: Renewable Energy

It is resolved to introduce the following new courses in the programmes in Department of Physics & Electronics, from the AY 2024-25

S.No	Course Code	Title of the new course	Programmes in which it is introduced
1	5	Renewable energy systems analysis	
2	6	Sustainable Energy and Environmental protection	
3	7	Waves & Oscillations	Second Year
4	8	Heat & Thermodynamics	B.Sc. Honors (Renewable Energy)
5	9	Electronic devices and circuits	
6	10	Solar Energy and applications	
7	11	Energy Storage Systems for Renewable Energy	

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS) KAKINADA

PITHAPUR RAJAH'S GOVERNMENT COLLEGE(AUTONOMOUS), KAKINADA
DEPARTMENT OF PHYSICS AND ELECTRONICS

Additions & Deletions
SEM II RENEWABLE ENERGY (MAJOR)
Course – 3
For the Academic Year 2024-25

S.No	Topics		Unit	Justification
	Deleted	Added		
1.	Commercial-Non-commercial Energy sources	Nil	I	Vast number of energy sources specified
2.	Ecological Foot print	Nil	I	Vast number of different types of footprints are given

PITHAPUR RAJAH'S GOVERNMENT COLLEGE(AUTONOMOUS), KAKINADA
DEPARTMENT OF PHYSICS AND ELECTRONICS

Additions & Deletions
SEM II RENEWABLE ENERGY (MAJOR)
Course – 4
For the Academic Year 2024-25

S.No	Topics		Unit	Justification
	Deleted	Added		
1.	nuclear power generation	Nil	V	Radio activity and Nuclear power separate unit is dedicated for this purpose
2.	hydroelectric power	Nil	V	Hydro power topics are present in a separate unit

PITHAPUR RAJAH'S GOVERNMENT COLLEGE(AUTONOMOUS), KAKINADA
DEPARTMENT OF PHYSICS AND ELECTRONICS

Percentage of Syllabi included/ Excluded – 2024-25

SI No.	Title of the Paper	% of change
1.	Renewable Energy resources-1	10
2.	Renewable Energy resources -2	10

Certificate

The syllabus and model question papers including **Blue – Print** in Renewable energy subject for 3 years B.Sc. course for the semester I,II,III,IV,V and VI for the academic year **2024-25**. list of examiners and paper setters, departmental activities which contains pages is approved in the Board of Studies meeting held offline and on line through the Google Meet app on **30 –04- 2024**

	Members of Board of Studies		Signatures of members
1	Dr. M.Surekha Head of the Department	Chairman	H.Surekha
2	Dr.P.Paul Diwakar	University nominee, Y.V.N.R Government college,Kaikaluru	
3	Dr.K.Jyothi	Subject Expert, Principal SVRKGDC(M),Nidadavolu	Jyothi
4	Dr. D.Sanjeev Kumar	Subject Expert, Assistant professor of Physics, Government College(A),Rajamahendravaram	
5	Sri.A.V.V Prasad	Representative from Industry, Solar Systems,Kakinada	
6	Dr.K.Nanda Gopal	~~Sr. Scientific Asst.~~IMD,Alumni	
7	Dr.K.Jayadev	Member	
8	Ms G. Sridevi	Member	
9	Smt.A.Padmavathi	Member	A.Padh
10	Dr S V G V A Prasad	Member	
11	Dr.P Himakar	Member	
12	Dr. K. Durga Rao	Member	K.Duya
13	Ms.D.Sravani	Member	
14	Mr.P.Veerendra	Member	P.VO
15	L.Subhash	Student Member I B.Sc PHY(HON)	L.subhash
16	B. Sri Durga Bhavani	Student Member, II MPC EM-2	B.Sri Durga Bhavani