# P.R. GOVERNMENT COLLEGE, KAKINADA

AN AUTONOMOUSE COLLEGE WITH NAAC "A" GRADE

## DEPARTMENT
## OF
## PHYSICS AND ELECTRONICS



# Board of Studies

# Physics

## 2018 - 2019

# P.R. Government College (A), Kakinada

## Department of Physics and Electronics

## INDEX

# P.R. Government College (A), Kakinada
## Department of Physics and Electronics

## Agenda

Discuss and Approve

1. Syllabi for $5^h$ and $6^{th}$ semesters.

2. Model question papers and Blue Print.

3. Semester End Practical Examination for I, II and III years

4. Panel of Question Paper Setters and Examiners.

5. Internal to External exams to be assessed in the ratio 40:60 for Second Year on par with First year and to continue assessment in the ratio 30:70 for III Year

6. Split up for Continuous Comprehensive Evaluation ( CCE)

7. Utilization of funds under various heads

8. Department Action plan for 2018-19.

9. Any other proposal with the permission of the chair

# P.R. Government College (A), Kakinada
## Department of Physics and Electronics

**RESOLUTIONS BOARD OF STUDIES MEETING OF PHYSICS**

**10th April 2018**

1. It is resolved to introduce Electricity, Magnetism, Basic and Digital Electronics as paper V & Modern Physics as paper VI in semester V

2. It is resolved to offer two Electives in VI semester. The student has to choose one of the two electives.
   **VII B Material Science**
   **VII C Renewable Energy**

3. It is resolved to offer two Cluster Electives in semester VI. The student has to choose one of the two electives.

   Cluster Elective B
   **VIII B1  Fundamentals of Nano Science**
   **VIII B2  Synthesis and Characterization of Nano Materials**
   **VIII B3  Project work**

   Cluster Elective C
   **VIII C1  Solar Thermal and Photovoltaic Aspects**
   **VIII C2 Wind, Hydro and Ocean Energies**
   **VIII C3 Project work**

4. It is resolved to approve the model question paper and blue print for I and II year

5. It is resolved to approve the model question paper and blue print for III year

6. It is resolved to approve the conduct of semester end practical exams for II year also on par with I and III year from the academic year 2018-19

7. It is resolved to approve blue print for Practical examination for all years

8. It is resolved to approve blue print for internal examination for all years

9. It is resolved to approve the split up of Continuous Comprehensive Evaluation

   For I and II year CCE – 20 Mar
   10 M – Project, 5M Seminar/ Assignment, 5 M – Quiz /Group discussion

   For III year CCE – 15 Marks
   5M - Seminar, 5M – Assignment, 5 M – Quiz /Group discussion

10. It is resolved to approve Department Action Plan for the academic year 2018-19

11. Resolved to approve funds allocated under various heads

| Sl. No | Purpose | Projected Amount |
|---|---|---|
| 1 | Board of Studies | 10,000/- |
| 2 | Invited Lectures | 10,000/- |
| 3. | lab equipment | 2,00,000/- |
| 4 | Reference Books | 50,000/- |
| 5. | Teaching learning Material | 20,000/- |
| 6. | Minor Repairs and Stationery | 40,000/- |
| 7. | Outreach Programme | 10,000/- |
| 8. | Field Trip | 50,000/- |
| 9 | Workshop /Seminar | 1,00,000/- |
| **Total** | | **4,90,000/-** |

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# P.R. Government College (A), Kakinada
## Department of Physics and Electronics
## AIM AND OBJECTIVES OF THE PROGRAMME

**Aim**

In this programme, we aim to provide a solid foundation in all aspects of physics and to show a broad spectrum of modern trends in physics and to develop experimental, computational and mathematical skills of students. The syllabi are framed in such a way that it bridges the gap between the plus two and post graduate levels of physics by providing a more complete and logical framework in almost all areas of basic physics.

## <u>The programme also aims</u>

➢ To provide education in physics of the highest quality at the undergraduate level and generate graduates of the caliber sought by industries and public service as well as academic teachers and researchers of the future.

➢ To attract outstanding students from all backgrounds.

➢ To provide an intellectually stimulating environment in which the students have the opportunity to develop their skills and enthusiasms to the best of their potential.

➢ To maintain the highest academic standards in undergraduate teaching.

➢ To impart the skills required to gather information from resources and use them.

➢ To equip the students in methodology related to physics.

**Objectives/Out comes**

**By the end of I year (2<sup>nd</sup> semester), the students should have,**

- ➢ Attained a common level in basic mechanics and properties of matter and laid a secure foundation in mathematics for their future courses.

- ➢ Developed their experimental and data analysis skills through a wide range of experiments in the practical laboratories.

**By the end of II year ( 4<sup>th</sup> semester), the students should have**

- ➢ Been introduced to powerful tools for tackling a wide range of topics in Thermodynamics, Statistical Mechanics and Electrodynamics.

- ➢ Become familiar with additional relevant mathematical techniques.

- ➢ Further developed their experimental skills through a series of experiments which also illustrate major themes of the lecture courses.

**By the end of III year ( 6<sup>th</sup> semester), the students should have**

- ➢ Covered a range of topics in almost all areas of physics including quantum mechanics, solid state physics, computational physics, electronics, Renewable Energy etc.

- ➢ Had experience of independent work such as projects, seminars etc.

Developed their understanding of core physics

| S.No. | Semester | PAPER | Course Code | Course | Hours/Week | Hours/Sem | Max. Marks | No. of Credits | Course Credits |
|-------|----------|-------|-------------|--------|------------|-----------|-----------|----------------|----------------|
| 1 | I | PAPER – 1 | PH1202 | Mechanics | 04 | 60 | 60 + 40 | 3 | 3 |
| 2 | I | Practical – 1 | PH1202 P | Mechanics | 02 | 30 | 50 | 2 | 2 |
| 3 | II | PAPER – 2 | PH2202 | Waves and Oscillations | 04 | 60 | 60 + 40 | 3 | 3 |
| 4 | II | Practical – 2 | PH2202 P | Waves and Oscillations | 02 | 30 | 50 | 2 | 2 |
| 5 | III | PAPER – 3 | PH3202 | Optics | 04 | 60 | 60 + 40 | 3 | 3 |
| 6 | III | Practical – 3 | PH3202 p | Optics | 02 | 30 | 50 | 2 | 2 |
| 7 | IV | PAPER – 4 | PH4202 | Thermodynamics | 04 | 60 | 60 + 40 | 3 | 3 |
| 8 | IV | Practical – 4 | PH4202 P | Thermodynamics | 02 | 30 | 50 | 2 | 2 |
| 9 | V | PAPER - 5 | PH5203 | Electrostatic & Magnetostatics Basic and Digital Electronics | 03 | 45 | 70 + 30 | 3 | 3 |
| 10 | V | Practical - 5 | PH5203 P | Electrostatic & Magnetostatics Basic and Digital Electronics | 02 | 30 | 50 | 2 | 2 |
| 11 | V | PAPER - 6 | PH5204 | Modern Physics | 03 | 45 | 70 + 30 | 3 | 3 |
| 12 | V | Practical - 6 | PH5204 P | Modern Physics | 02 | 30 | 50 | 2 | 2 |
| 13 | VI | PAPER VII - A | Elective | Analog and Digital Electronics | 03 | 45 | 70 + 30 | 3 | 3 |
| 14 | VI | PAPER VII - B | | Materials Science | 03 | 45 | 70 + 30 | 3 | 3 |
| 15 | VI | **PAPER VII - C** | | **Renewable energy** | 03 | 45 | 70 + 30 | 3 | 3 |
| 16 | VI | Practical VII (A/B/C) | | Elective practical | 02 | 30 | 50 | 2 | 2 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 17 | VI | PAPER VIII(A)-1 | Cluster Elective - A | Introduction to Microprocessor and Microcontrollers | 03 | 45 | 70 + 30 | 3 | 3 |
| 18 | VI | Practical VIII (A) - 1 | | Cluster Elective practical – (A) -1 | 02 | 30 | 50 | 2 | 2 |
| 19 | VI | PAPER VIII(A)-2 | | Computational Physics and VI Programming | 03 | 45 | 70 + 30 | 3 | 3 |
| 20 | VI | Practical VIII (A) - 2 | | Cluster Elective practical – (A) - 2 | 02 | 30 | 50 | 2 | 2 |
| 21 | VI | PAPER VIII(A)-3 | | Project work | 03 | 45 | 70 + 30 | 3 | 3 |
| 22 | VI | Practical VIII (A) - 3 | | Online course/ Presentation in fests/workshops etc | 02 | 30 | 50 | 2 | 2 |
| 23 | VI | PAPER VIII(B)-1 | Cluster Elective - B | Fundamentals of Nanoscience | 03 | 45 | 70 + 30 | 3 | 3 |
| 24 | VI | Practical VIII (B) - 1 | | Cluster Elective practical – (B) - 1 | 02 | 30 | 50 | 2 | 2 |
| 25 | VI | PAPER VIII(B)-2 | | Synthesis and Characterization of nanomaterials | 03 | 45 | 70 + 30 | 3 | 3 |
| 26 | VI | Practical VIII (B) - 2 | | Cluster Elective practical – (B) - 2 | 02 | 30 | 50 | 2 | 2 |
| 27 | VI | PAPER VIII(B)-3 | | Project work | 03 | 45 | 70 + 30 | 3 | 3 |
| 28 | VI | Practical VIII (B) - 3 | | Online course/ Presentation in fests/workshops etc | 02 | 30 | 50 | 2 | 2 |
| 29 | VI | PAPER VIII(C)-1 | **Cluster Elective - C** | Solar Thermal and Photovoltaic Aspects | 03 | 45 | 70 + 30 | 3 | 3 |
| 30 | VI | Practical VIII(C)-1 | | Cluster Elective practical – C-1 | 02 | 30 | 50 | 2 | 2 |
| 31 | VI | PAPER VIII(C)-2 | | Wind, Hydro and Ocean Energies | 03 | 45 | 70 + 30 | 3 | 3 |
| 32 | VI | Practical VIII (C) - 2 | | Cluster Elective practical – C -2 | 02 | 30 | 50 | 2 | 2 |

# P.R. Government College (A), Kakinada

Blue print for Semester End examination
For IYear (Sem I & sem II) & II year (Sem III & semIV)  Papers
## **Subject Paper**

| 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 | 5 | 10 | 50 | 3 | 10 | 30 |
| 2 | Section – B Short answer Question | 9 | 5 | 45 | 6 | 5 | 30 |
| **TOTAL** | | | | **95** | | | **60** |

**Percentage of Choice given**  $= \dfrac{95-60}{95} \; x \; 100$

$= \dfrac{35}{95} \; x \; 100 \qquad = 36.8 \, \%$

Blue print for Internal examination
For IYear (Sem I & sem II) & II year (Sem III & semIV) Papers
# **Subject Paper**

| 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 | 2 | 10 | 20 | 2 | 10 | 20 |
| 2 | **Section – B** short answer questions | 4 | 5 | 20 | 4 | 5 | 20 |
| | **TOTAL** | | | **40** | | | **40** |

$$\text{Percentage of Choice given} = \frac{0}{40} \times 100 = 0\%$$

**The total of two internals is reduced to 20 marks and the other 20 marks are further divided as follows**

| | |
|---|---|
| Seminar | = 5 marks |
| Assignment | = 10 marks |
| Group discussion/quiz | = 5 marks |
| Total | = 20 marks |

## **Subject Paper & Cluster**

| 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 | 4 | 10 | 40 |
| 2 | Section – B Short answer question | 10 | 5 | 50 | 6 | 5 | 30 |
| | **TOTAL** | | | **110** | | | **70** |

**Percentage of Choice given** **=** $\dfrac{(110-70)x\ 100}{110} = \mathbf{36.36}$ %

# Subject Paper & Cluster

| 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** Long answer questions | 1 | 10 | 10 | 1 | 10 | 10 |
| 2 | **Section – B** Short answer questions | 4 | 5 | 20 | 4 | 5 | 20 |
| | **TOTAL** | | | **30** | | | **30** |

**Percentage of Choice given** $= \dfrac{(30-30)x\ 100}{30} = 0\ \%$

**The total of two internals is reduced to 15 marks and the other 15 marks are further divided as follows**

| | |
|---|---|
| Seminar | = 5 marks |
| Assignment | = 5 marks |
| Group discussion/quiz | = 5 marks |
| Total | = 15 marks |

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

# **Practial Paper**

### **Scheme of Valuation for Practicals**

Time:2 hrs                                                     Max.Marks:50


  1. Formulae & Explanation                    - 6 Marks

  2. Tabular form + graph + circuit diagram     - 6 Marks

 3. Observations                                - 12 Marks

 4. Calculation, graph, precaution and results     - 06 Marks

 5. Viva voice                                  - 10 Marks

 6. Records                                     - 10 Marks

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

# P.R. Government College (A), Kakinada.

## I B.Sc., Physics-Semester-I Paper – I

w.e.f. 2018-19 ADMITTED BATCH

## MECHANICS

**Course Code : PH1202**                    **No. of credits : 03**        **4**
**Hours/Week**                              **Total hours: 60 hrs**

**Module – 1**         **Vector Analysis (8):**

Scalar and vector fields, gradient of a scalar field and its physical significance (L). Divergence of vector field and its physical significance (L).   Curl of a vector field and its physical significance (L). Vector related problems.  Vector integration- line, surface and volume integrals.  Stokes, Gauss and Greens theorems (Statements only) (L).

1. **Module – 2**         **Mechanics of Particles(10)**
   Laws of motion, motion of variable mass system (L), motion of a rocket, multi-stage rocket(S), conservation of energy and momentum (L).  Collisions in two and three dimensions (L), concept of impact parameter, Rutherford scattering angle - derivation (L)

2. **Module – 3**         **Mechanics of rigid bodies(10)**
   Definition of Rigid body (L), rotational kinematic relations (L), equation of motion for a rotating body (T), angular momentum and inertial tensor (L).  Euler's equation (T), Gyroscope(S), precession of the equinoxes (L)

4  **Module – 4**         **Mechanics of continuous media(10)**
   Elastic constants of isotropic solids and their relations (L), Poisson's ratio and expression for Poisson's ratio in terms of y, n, k (T). Classification of beams (P), cantilever with an end load (L) – Torsional oscillations – determination of rigidity modulus by torsional pendulum (T) (Disc method)

**5   Module – 5                Central forces(12)**

Central forces – definition and examples(L), conservative nature of central forces(L), conservative force as a negative gradient of potential energy(T), equation of motion under a central force(T), gravitational potential and gravitational field, motion under inverse square law(S), derivation of Kepler's laws(T).Geo stationary satellite , motion of the satellite.

**6   Module – 6                Special theory of relativity (10)**

Galilean relativity (L), absolute frames, Michelson-Morley experiment(S), Postulates of special theory of relativity(S).  Lorentz transformations, time dilation, length contraction, mass-energy relation(T).

## Textbooks

1. Berkeley Physics Course. Vol.1, **Mechanics** by C. Kittel, W. Knight, M.A. Ruderman - *Tata-McGraw hill Company Edition 2008*.
2. **Fundamentals of Physics**. Halliday/Resnick/Walker *Wiley India Edition 2007*.
3. **Waves and Oscillations**. S. Badami, V. Balasubramanian and K. Rama Reddy *Orient Longman*.
4. **First Year Physics** - *Telugu Academy*.
5. **Mechanics of Particles, Waves and Oscillations**. Anwar Kamal, *New Age International*.
6. **College Physics-I**.  T. Bhimasankaram and G. Prasad.  *Himalaya Publishing House*.
7. **Introduction to Physics for Scientists and Engineers**. F.J. Ruche. *McGraw Hill*.
8. **Waves and Oscillations**.  N. Subramaniyam and Brijlal *Vikas Publishing House Private Limited*.

## Reference Books

1. Physics                                                    Halliday & Resnick
2. Properties of Matter                              D.S.Mathur
3. Lectures on Physics                              Richard Feynmann
4. University Physics                                Zemansky
5. Mechanics                                             Berkley Series
6. Mechanics, waves and oscillations          S.L. Gupta and Sanjeev gupta
7. **Fundamentals of Physics** by Alan Giambattista et al *Tata-McGraw Hill Company* Edition, 2008.
8. **University Physics** by Young and Freeman, *Pearson Education, Edition 2005*.
9. **Sears and Zemansky's University Physics** by Hugh D. Young, Roger A. Freedman *Pearson Education Eleventh Edition*.
10. **An introduction to Mechanics** by Daniel Kleppner & Robert Kolenkow.  *The McGraw Hill Companies*.
11. **Mechanics**. Hans & Puri. *TMH Publications*.
12. **Engineering Physics**. R.K. Gaur & S.L. Gupta. *Dhanpat Rai Publications*.
13. **Mechanics by D**.S Mathur.

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**I B.Sc., Semester – I (Model paper)**
**PHYSICS  - Paper 1**
**(MECHANICS)**

**Course Code : PH1202**                                                  **No. of credits : 03**
**w.e.f. 2018-19 ADMITTED BATCH**

**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 : 60

| Section | Questions to be given | Questions to be answered | Marks |
|---------|-----------------------|--------------------------|-------|
| A | 5 | 3 | 3 x 10M = 30M |
| B | 9 | 6 | 6 x 5 M = 30M |
| Total | 14 | 9 | 60M |

## Blue Print

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

Note: At least ONE problem should be answered.

# P.R. Government College (A), Kakinada

## I B.Sc.,   Physics-Practical Semester – I

W.E.F . 2018-19 ADMITTED BATCH

**Course Code : PH1202P**                                    **No. of credits : 02**

**2 Hours/Week**                                    **Total hours :  30**

Any six experiments.

1. Study of a compound pendulum determination of 'g' and 'k
2. Study of damping of an oscillating disc in Air and Water logarithmic decrement
3. Study of Oscillations under Bifilar suspension
4. Study of oscillations of a mass under different combination of springs
5. 'Y' by uniform Bending (or) Non-uniform Bending
6.  'n' by torsion Pendulum
7. Verification of Laws of a stretched string (Three Laws)
8. Study of Viscosity of a fluid by different methods

# P.R. Government College (A), Kakinada.

## I B.Sc., Physics-Semester – II  Paper – II

### WAVES AND OSCILLATION

**Course Code : PH2202**                                      **No. of credits : 03**

**w.e.f. 2018-19 ADMITTED BATCH**

**Hours/Week 4**                                               **Total hours : 60**

**1. Module – 1          Fundamentals of Vibrations(12)**

Simple harmonic oscillator and solution of the differential equation(T)– Physical characteristics of SHM(P) - combination of two mutually perpendicular simple harmonic vibrations of same frequency and different frequencies(T), Lissajous figures – applications(L).

**2. Module – 2          Damped and Forced Oscillations(12)**

Damped harmonic oscillator(L), solution of the differential equation of damped oscillator(T). Logarithmic decrement, relaxation time, quality factor, differential equation of forced oscillator and its solution(P).

**3. Module – 3          Complex vibrations and coupled oscillations (6)**

Fourier theorem and evaluation of the Fourier coefficients(T), analysis of periodic wave functions-square wave(T), saw-tooth wave(P)

**4. Module – 4          Vibrations of bars (12)**

Longitudinal vibrations in bars- wave equation and its general solution(T).  Special cases (i) bar fixed at both ends ii) bar fixed at the midpoint iii) bar free at both ends iv) bar fixed at one end(T). Tuning fork(P). Comparison between Longitudinal and Teraservers Vibrations in a bar

**5. Module – 5          Vibrating Strings (12)**

Transverse wave propagation along a stretched string, general solution of wave equation and its significance (T), modes of vibration of stretched string clamped at both ends(L), overtones.

**6. Module – 6               Ultrasonics (6)**

Ultrasonics, properties of ultrasonic waves, production of ultrasonics by piezoelectric and magnetostriction methods(L), detection of ultrasonics. Applications of ultrasonic waves – ultra sound scan(S).

## Textbooks

1. **Berkeley Physics** Course. Vol.1,
2. **Mechanics** by C. Kittel, W. Knight, M.A. Ruderman - *Tata-McGraw hill Company Edition 2008.*
3. **Fundamentals of Physics**. Halliday/Resnick/Walker *Wiley India Edition 2007*.
4. **Waves and Oscillations**. S. Badami, V. Balasubramanian and K. Rama Reddy *Orient Longman*.
5. **First Year Physics** - *Telugu Academy*.
6. **Mechanics of Particles, Waves and Oscillations**. Anwar Kamal, *New Age International*.
7. **College Physics-I**. T. Bhimasankaram and G. Prasad. *Himalaya Publishing House*.
8. **Introduction to Physics for Scientists and Engineers**. F.J. Ruche. *McGraw Hill*.
9. **Waves and Oscillations**. N. Subramaniyam and Brijlal *Vikas Publishing House Private Limited*.
10. Mechanics, waves and oscillations        S.L. Gupta and Sanjeev Gupta

## Reference Books

1. **Fundamentals of Physics** by Alan Giambattista et al *Tata-McGraw Hill Company* Edition, 2008.
2. **University Physics** by Young and Freeman, *Pearson Education, Edition 2005*.
3. **Sears and Zemansky's University Physics** by Hugh D. Young, Roger A. Freedman *Pearson Education Eleventh Edition*.
4. **An introduction to Mechanics** by Daniel Kleppner & Robert Kolenkow. *The McGraw Hill Companies*.
5. **Mechanics**. Hans & Puri. *TMH Publications*.
6. **Engineering Physics**. R.K. Gaur & S.L. Gupta. *Dhanpat Rai Publications*.
7. Waves and oscillations        Brijlal and Subrahmanyam.
8. Mechanics and waves        Berkley series

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**I B.Sc.,  Semester – II ( Model paper )**
**PHYSICS PAPER – II**
w.e.f. 2018-19 ADMITTED BATCH

**(Waves and oscillations)**

**Course Code : PH2202**                                    **No. of credits : 03**

**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 : 60

| Section | Questions to be given | Questions to be answered | Marks |
|---------|----------------------|--------------------------|-------|
| A | 5 | 3 | 3 x 10M = 30M |
| B | 9 | 6 | 6 x 5 M = 30M |
| Total | 14 | 9 | 60M |

## **Blue Print**

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

Note: At least ONE problem should be answered.

# P.R. GOVERNMENT COLLEGE (A), KAKINADA

## I B.Sc., Physics-Practical II    Semester – II
w.e.f. 2018-19 ADMITTED BATCH

**Course  Code : PH1202P(B)**                          **No. of credits : 02**
**2 Hours/Week**                                        **Total hours :  30**

Any six experiments.

1. Study of flow of liquids through capillary

2. Determination of Surface Tension of a liquid by different methods

3. Volume Resonator –determination of frequency of a tuning fork

4. Velocity of Transverse wave along a stretched string

5. Determination of  frequency of a Bar-Melde's experiment

6. Measurement of errors –simple Pendulum

7. Moment of Inertia of a fly wheel

8. Observation of Lissajous figures from CRO

# P.R. Government College (A), Kakinada

**II B.Sc., PHYSICS- SEMESTER-III Paper – III**
w.e.f. 2017-18 ADMITTED BATCH

## OPTICS

**Course Code : PH3202**                                   **No. of credits : 03**

**4 Hours/Week**                                           **Total Hours :  60**

1) **Module – 1       The Matrix methods in paraxial optics: (8)**

 Introduction, the matrix method(L), **optical direction cosine -** effect of translation,  effect of refraction(T), System matrix - System matrix and lens formula for thick & thin lenses (L) – System marix for the combination of two  thin lenses in contact & seperated by a distance (T).

2) **Module – 2       Interference: (10)**

Principle of superposition(L) – coherence – Theory of interference fringes(L) - conditions for Interference of light(L)

**Interference by division of wave front**: Fresnel's biprism – determination of wave length of light(T). Determination of thickness of a transparent material using Biprism (L)– Lloyd's mirror experiment(S).

3) **Module – 3       Interference: (12)**

**Interference by division of amplitude**: Oblique incidence of a plane wave on a thin film due to reflected and transmitted light (Cosine law)(T) – Colours of thin films – Non reflecting films(L) – Determination of diameter of wire-Newton's rings in reflected light with contact between lens and glass plate(T) – Determination of wave length of monochromatic light (S)– Michelson Interferometer (Theory only) – Determination of wavelength of monochromatic light(S).

4) **Module – 4            Diffraction: (12)**

Introduction – Distinction between Fresnel and Fraunhoffer diffraction(L) -Fraunhoffer diffraction- Diffraction due to single slit (L) – Fraunhoffer diffraction due to double slit(S) Resolving Power of grating – Determination of wave length of light in normal and oblique incidence methods using diffraction grating(L).

**Fresnel diffraction**:-

Fresnel's half period zones(L) – area of the half period zones –zone plate – Comparison of zone plate with convex lens  – difference between interference and diffraction(S).

5) **Module – 5            Polarization (12)**

Polarized light : Methods of Polarization(L), Polarization by reflection(T), refraction, Double refraction, selective absorption,– Brewster's law(L) – Malus law – Nicol prism polarizer and analyzer(L) – Quarter wave plate(L), Half wave plate (L)– Optical activity(L), analysis of light by Laurent's half shade polarimeter(S).

6) **Module – 6            Laser  (06)**

Lasers: Introduction – Spontaneous emission – Stimulated emission – Population inversion(L) . Laser principle – Einstein coefficients(T) – Types of Lasers – He-Ne laser (L)– Ruby laser (L)– Applications of lasers(S).

### Textbooks

1. **Optics** by Ajoy Ghatak. *The McGraw-Hill companies*.
2. **Optics** by Subramaniyam and Brijlal. *S. Chand & Co*.
3. **Fundamentals of Physics**.  Halliday/Resnick/Walker.*C. Wiley India Edition 2007*.
4. **Optics and Spectroscopy**. R. Murugeshan and Kiruthiga Siva Prasath. *S. Chand & Co*.
5. **Second Year Physics** – *Telugu Academy*.
6. **Modern Physics** by R. Murugeshan and Kiruthiga Siva Prasath (for statistical Mechanics) *S. Chand & Co*.

### Reference Books

1. **Modern Physics** by G. Aruldhas and P. Rajagopal, *Eastern Economy Education*.
2. **Modern Engineering Physics** by A.S. Vasudeva. *S.Chand & Co. Publications*.
3. **Feyman's Lectures on Physics** Vol. 1,2,3 & 4. *Narosa Publications*.
4. **Fundamentals of Optics** by Jenkins A. Francis and White E. Harvey, *McGraw Hill Inc.*

## II B.Sc. - III SEMESTER END EXAMINATION
## PHYSICS – PAPER III (Model Paper)    Semester III
### w.e.f. 2017-18 ADMITTED BATCH

## OPTICS

**Course Code : PH3202**                                              **No. of credits : 03**

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

Time: 21/2 Hrs.                                              Max. Marks: 60

| Section | Questions to be given | Questions to be answered | Marks |
|---------|----------------------|-------------------------|-------|
| A | 5 | 3 | 3 x 10M = 30M |
| B | 9 | 6 | 6 x 5 M = 30M |
| Total | 14 | 9 | 60M |

## Blue Print

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

Note: At least ONE problem should be answered.

# P.R. Government College (A), Kakinada

**II B.Sc.,    Physics-Practical III    Semesters –III**
w.e.f. 2017-18  ADMITTED BATCH

**Course  Code : PH3202P**                                          **No. of credits : 02**

                                                                                                    **2**

           **Hours/Week**                                    **Total hours: 30**

**Any Six experiments.**

1.  Thickness of a wire-wedge method.

2.  Determination of Radius of curvature of a given convex lens- Newton's rings..

3.  Study of optical rotation - polarimeter.

4.   Dispersive power of a prism

5.  Determination of wavelength of light using diffraction grating minimum deviation method.

6.  Resolving power of a telescope.

7.  Refractive index of a liquid and glass (Boys Method).

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## P.R. GOVERNMENT COLLEGE (A), KAKINADA

### II B.Sc., PHYSICS- SEMESTER-IV  Paper – IV
w.e.f. 2017-18 ADMITTED BATCH

### THERMODYNAMICS

**Course Code : PH4202**                                                    **No. of credits : 03**

**4 Hours/Week**                                                             **Total hours : 60**

**Unit – I**                                                                              **33 hrs**
1.  **Module – 1**          **Kinetic theory of gases: (11)**

Introduction(L) – Deduction of Maxwell's law of distribution of molecular speeds(T), C, $C_p$ & $C_{rms}$ and  the relation among them(T) - Mean free path - Transport Phenomena(L) – Viscosity of gases – thermal conductivity – diffusion of gases(T).

2.  **Module – 2**          **Thermodynamics: (12)**

Introduction – Reversible and irreversible processes(L) – Carnot's engine and its efficiency (T)– Carnot's theorem (L)– Second law of thermodynamics, Kelvin's and Clausius statements(T) –Entropy, physical significance (L)– Change in entropy in reversible and irreversible processes (L)– Entropy and disorder – Entropy of universe(L) – Temperature- Entropy (T-S) diagram(L).

3.  **Module – 3**    **Thermodynamic potentials and Maxwell's equations: (10)**

Thermodynamic potentials – Derivation of Maxwell's thermodynamic relations (T)– Clausius-Clayperon's equation (T)– Derivation for ratio of specific heats(T) – Derivation for difference of two specific heats for perfect gas(T). Stephen – Boltzmann law - derivation

**Unit – II**                                                                            **27 hrs**

4.  **Module – 4    Low temperature Physics: (12)**

Introduction – Joule Kelvin effect – liquefaction of gas using porous plug experiment(L). Joule expansion – Distinction between adiabatic and Joule Thomson expansion – Expression for Joule Thomson cooling(T) – Liquefaction of helium, Kapitza's method (L)– Adiabatic demagnetization – Production of low temperatures(L) – Principle of refrigeration, vapour compression type(S). Working of refrigerator.

5. **Module – 5**          **Quantum theory of radiation 1: (8)**

Black body-Ferry's black body(L) – Quantum theory of radiation - Planck's law – deduction of Wein's law, Rayleigh-Jeans law, from Planck's law (T)-

6. **Module – 6**          **Quantum theory of radiation 2: (7)**

Measurement of radiation – Types of pyrometers(S) – Disappearing filament optical pyrometer experiment (S) – Angstrom pyroheliometer(L) - determination of solar constant, temperature of sun(T).

## Textbooks

1. **Fundamentals of Physics**.  Halliday/Resnick/Walker.*C. Wiley India Edition 2007*.
2. **Optics and Spectroscopy**. R. Murugeshan and Kiruthiga Siva Prasath. *S. Chand & Co*.
3. **Second Year Physics** – *Telugu Academy*.
4. **Modern Physics** by R. Murugeshan and Kiruthiga Siva Prasath (for statistical Mechanics) *S. Chand & Co*.

## Reference Books

1. **Modern Physics** by G. Aruldhas and P. Rajagopal, *Eastern Economy Education*.
2. Berkeley Physics Course. Volume-5. **Statistical Physics** by F. Reif. *The McGraw-Hill Companies*.
3. **An Introduction to Thermal Physics** by Daniel V. Schroeder.*Pearson Education Low Price Edition*.
4. **Thermodynamics** by R.C. Srivastava, Subit K. Saha & Abhay K. *Jain Eastern Economy Edition*.
5. **Modern Engineering Physics** by A.S. Vasudeva. *S.Chand & Co. Publications*.
6. **Feyman's Lectures on Physics** Vol. 1,2,3 & 4. *Narosa Publications*.

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**II B.Sc., SEMESTER – IV        PAPER IV ( Model Paper)**
w.e.f. 2017-18 ADMITTED BATCH

**THERMODYNAMICS**

**Course Code : PH4202**                    **No. of credits : 03**

**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 : 60

| Section | Questions to be given | Questions to be answered | Marks |
|---------|-----------------------|--------------------------|-------|
| A | 5 | 3 | 3 x 10M = 30M |
| B | 9 | 6 | 6 x 5 M = 30M |
| Total | 14 | 9 | 60M |

## Blue Print

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

Note: At least ONE problem should be answered.

**P.R. GOVERNMENT COLLEGE (A), KAKINADA**

**II B.Sc.,   Physics-Practicals IV      Semesters – IV**
w.e.f. 2017-18 ADMITTED BATCH

**Course  Code : PH4202P**                              **No. of credits : 02**

**2 Hours/Week**                                          **Total hours: 30**

**Any Six experiments.**

1. Thermal conductivity of bad conductor-Lee's method

2. Study of variation of resistance with temperature – thermistor

3. Heating efficiency of electrical kettle with varying voltages.

4. Thermo emf- thermo couple – potentiometer

5. Measurement of Stefan's constant.

6. Specific heat of a liquid by applying Newton's law of cooling correction.

## P.R. GOVERNMENT COLLEGE (A), KAKINADA
## III B.Sc Physics Paper V – Semester – V
w.e.f. 2016-17 ADMITTED BATCH

**Course Code : PH5203**            **No. of credits : 03**
**Electrostatic & Magneto statics, Basic and Digital Electronics**

| No. of Hours per weak: 3 | Total Lectures:45 |
|---|---|

### UNIT-I (8 hrs)
**1. Electric field intensity and potential:**
Gauss's law statement and its proof- Electric field intensity due to (1) Uniformly charged sphere and (2) an infinite conducting sheet of charge. Electrical potential – equipotential surfaces- potential due to i) a point charge, ii) *Dipole* and iii) circular disc

### UNIT-II (6 hrs)
**2. Dielectrics:**
Electric dipolemoment and molecular polarizability- Electric displacement D, electric polarization P – relation between D, E and P- Dielectric constant and susceptibility. Boundary conditions at the dielectric surface.

### UNIT-III (7 hrs)
**3. Electric and magnetic fields**
Biot-Savart's law, explanation and calculation of B due to long straight wire, a circular current loop and solenoid – Lorentz force – Hall effect – determination of Hall coefficient and applications.

### UNIT-IV (8 hrs)
**4. Electromagnetic induction**
Faraday's law-Lenz's law- Self and mutual inductance, coefficient of coupling, calculation of self inductance of a long solenoid, energy stored in magnetic field. Transformer - energy losses - efficiency.

### UNIT-V (7 hrs)
**5. Basic electronics:**
*Band theory of solids* - PN juction diode, Zener diode, Tunnel diode, I-V characteristics, PNP and NPN transistors, CB, CE and CC configurations – Relation between$\alpha$, $\beta$ and $\gamma$ - transistor (CE) characteristics -Determination of hybrid parameters, Transistor as an amplifier.

### UNIT-VI: (9 hrs)
**6. Digital electronics**
Number systems - Conversion of binary to decimal system and vice versa.Binary addition and subtraction (1's and 2's complement methods).Laws of Boolean algebra - De Morgan's

laws-statement and proof, Basic logic gates, NAND and NOR as universal gates, exclusive-OR gate, Half adder and Full adder, Parallel adder circuits.

**REFERENCE BOOKS**

1. BSc Physics, Vol.3, Telugu Akademy, Hyderabad.
2. Electricity and Magnetism, D.N. Vasudeva. S. Chand & Co.
3. Electricity, Magnetism with Electronics, K.K.Tewari, R.Chand& Co.,
4. Principles of Electronics, V.K. Mehta, S.Chand& Co.,
5. Digital Principles and Applications, A.P. Malvino and D.P.Leach, McGrawHill Edition.

**P.R. GOVERNMENT COLLEGE (A), KAKINADA**

**III B.Sc  Physics Paper – V – Semester – V – Model Paper**
w.e.f. 2016-17 ADMITTED BATCH

**Course  Code : PH5203**                                    **No. of credits : 03**

**Electrostatic & Magneto statics, Basic and Digital Electronics**

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

Time: 3 Hrs.                                                          Max. Marks: 70

| Section | Questions to be given | Questions to be answered | Marks |
|---------|-----------------------|--------------------------|-------|
| A | 6 | 4 | 4 x 10M = 40M |
| B | 10 | 6 | 6 x 5 M = 30M |
| Total | 16 | 10 | 70M |

## Blue Print

| Module | Essay Questions 10  marks | Short Questions 5 marks | Problems 5 marks | Marks allotted |
|--------|---------------------------|-------------------------|------------------|----------------|
| I | 1 | 1 | 1 | 20 |
| II | 1 | 1 | - | 15 |
| III | 1 | 1 | 1 | 20 |
| IV | 1 | 1 | 1 | 20 |
| V | 1 | 1 | - | 15 |
| VI | 1 | 1 | 1 | 20 |
| **Total Marks** | | | | 110 |

Note: At least two problems should be answered.

**P.R. GOVERNMENT COLLEGE (A),KAKIINADA**

**III B.Sc.,   Physics-Practicals –paper V  Semesters – V**
w.e.f. 2016-17 ADMITTED BATCH

**2 HOUR/WEEK**                                    **TOTAL HOURS : 30**

**No. of credits: 2**

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

1.  LCR circuit series/parallel resonance, Q factor.

2.  Determination of ac-frequency –sonometer.

3.  Verification of Kirchoff's laws and maximum power transfer theorem.

4.  Field along the axis of a circular coil carrying current.

5.  PN Junction Diode Characteristics.

6.  Zener Diode Characteristics.

7.  Transistor CE Characteristics- Determination of hybrid parameters.

8.  Logic Gates- OR,AND,NOT and NAND gates. Verification of Truth Tables.

9.  Verification of De Morgan's Theorems.

# P.R. GOVERNMENT COLLEGE (A), KAKINADA

## III B.Sc  Physics Paper – VI – Semester – VI
2016-17 Admitted batch

**Course  Code : PH6203**                                  **No. of credits : 03**

Modern Physics

**No. of Hours per week: 03**                              **Total Lectures:45**

## UNIT-I (7 hrs)
### 1.  Atomic physics
Introduction –Drawbacks of Bohr's atomic model- Sommerfeld's elliptical orbits-relativistic correction (no derivation).Vector atom model and Stern-Gerlach experiment - quantum numbers associated with it.  L-S and j- j coupling schemes. Zeeman effect and its experimental arrangement.

## UNIT-II (6 hrs)
### 2.  Molecular physics
Raman effect, hypothesis, Stokes and Anti Stokes lines. Quantum theory of Raman effect. Experimental arrangement – Applications of Raman effect.

## UNIT-III (10 hrs)
### 3.  Matter waves & Uncertainty Principle
Matter waves, de Broglie's hypothesis - wavelength of matter waves, Properties of matter waves - Davisson and Germer experiment – Phase and group velocities.
Heisenberg's uncertainty principle for position and momentum (x and p), & energy and time (E and t). Experimental verification - Complementarily principle of Bohr.

## UNIT-IV (9 hrs)
### 4.  Quantum (wave) mechanics
Basic postulates of quantum mechanics-Schrodinger time independent and time dependent wave equations-derivations. Physical interpretation of wave function. Eigen functions, Eigen values. Application of Schrodinger wave equation to particle in one dimensional infinite box.

## UNIT-V (6 hrs)
### 5.  General properties of nuclei:
Basic properties of nucleus – size, mass, charge, spin, magnetic dipole and electric quadrupole moment, Liquid drop model, Shell model (Qualitative), Magic numbers.

## UNIT-VI (7 hrs)
### 6.  Radio active decay:

Alpha decay: basics of alpha decay processes, theory of alpha decay, Gamow's theory, Geiger – Nuttal law. Beta decay, energy kinematics for Beta decay, positron emission, electron capture, neutrino hypothesis.

**REFERENCE BOOKS**
1. BSc Physics, Vol.4, Telugu Akademy, Hyderabad
2. Molecular Structure and Spectroscopy by G. Aruldhas. Prentice Hall of India, New Delhi.
3. Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath. S. Chand & Co.
4. Modern Physics by G. Aruldhas& P. Rajagopal. Eastern Economy Edition.
5. Concepts of Modern Physics by Arthur Beiser. Tata McGraw-Hill Edition.
6. Quantum Mechanics, Mahesh C Jain, Eastern Economy Edition.
7. Elements of Solid State Physics, J.P.Srivastava, Prentice Hall of India Pvt., Ltd.
8. Solid State Physics, A.J. Dekker, McMillan India.

## P.R. GOVERNMENT COLLEGE (A), KAKINADA
### III B.Sc Physics Paper – VI – Semester – VI (Model Paper)
2016-17 ADMITTED BATCH

**Course Code : PH6203**                                  **No. of credits : 03**
### Modern Physics

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

Time: 3 Hrs.                                              Max. Marks: 70

| Section | Questions to be given | Questions to be answered | Marks |
|---------|------------------------|---------------------------|-------|
| A | 6 | 4 | 4 x 10M = 40M |
| B | 10 | 6 | 6 x 5 M = 30M |
| Total | 16 | 10 | 70M |

## Blue Print

| Module | Essay Questions 10 marks | Short Questions 5 marks | Problems 5 marks | Marks allotted |
|--------|---------------------------|--------------------------|-------------------|-----------------|
| I | 1 | 1 | 1 | 20 |
| II | 1 | 1 | - | 15 |
| III | 1 | 1 | 1 | 20 |
| IV | 1 | 1 | 1 | 20 |
| V | 1 | 1 | - | 15 |
| VI | 1 | 1 | 1 | 20 |
| **Total Marks** | | | | 110 |

Note: At least two problems should be answered.

# P.R. GOVERNMENT COLLEGE (A), KAKINADA

## III B.Sc  Physics Practical -VI – Semester – VI
w.e.f. 2016-17 ADMITTED BATCH


**Work load: 30 hrs**                                   **Duration: 2 hrs/week**
**Minimum of 6 experiments to be done and recorded**

1. e/m of an electron by Thomson method.
2. Determination of Planck's Constant (photocell).
3. Verification of inverse square law of light using photovoltaic cell.
4. Study of absorption of α-rays.
5. Study of absorption of □-rays.
6. Determination of Range of β-particles.
7. Determination of M & H.
8. Analysis of powder X-ray diffraction pattern to determine properties of crystals.
9. Energy gap of a semiconductor using junction diode.
10. Energy gap of a semiconductor using thermister.
11. Thevinin Norton Theorems/Construction of Ohm Meter
12. L-R & C-R Circuits
13. L & II Filters (Bridge Rectifier)
14. L-D-R Characteristics

## P.R. GOVERNMENT COLLEGE (A), KAKINADA
### III B.Sc  Physics Paper – VII(B) – Semester – VI
w.e.f. 2016-17 ADMITTED BATCH

### 2018 - 2019.

**Course  Code :**                                                **No. of credits : 03**

### Elective Paper VII(B): Material science

**No. of Hours per week: 03**                                    **Total Lectures:45**

UNIT-I (9 hrs)

1.Materials and Crystal Bonding: Materials, Classification, Crystalline, Amorphous, Glasses; Metals, Alloys, Semiconductors, Polymers, Ceramics, Plastics,                Bio-aterials, Composites, Bulk and nanomaterials. Review of atomic structure – Interatomic forces Different types of chemical bonds – Ioniccovalent bond or homopolar bond – Metallic bond – Dispersion bond – Dipole bond – Hydrogenbond – Binding energy of a crystal.

UNIT-II (9 hrs)

2. Defects and Diffusion in Materials: Introduction – Types of defects - Point defectsLine defects- Surface defects- Volume defects- Production and removalofdefectsDeformation-irradiation- quenching- annealing- recovery - recrystallization and grain growth. Diffusion in solids- Fick's laws of diffusion.

UNIT-III(9 hrs)

3. Mechanical Behavior of Materials: Different mechanical properties of engineering materials – Creep – Fracture – Technologicalproperties – Factors affecting mechanical properties of a material – Heat treatment - Cold andhot working – Types of mechanical tests – Metal forming process – Powder – Misaligning – Deformation of metals.

UNIT-IV (9 hrs)

4. Magnetic Materials:Dia-, Para-, Ferri- and Ferromagnetic materials, Classical Langevin theory of dia magnetism, Quantum mechanical treatment of paramagnetism. Curie's law, Weiss's theory of ferromagnetism, Ferromagnetic domains.Discussion of BH Curve.Hysteresis and energy Loss.

UNIT-V (9 hrs)

5. Dielectric Materials:Dielectric constant, dielectric strength and dielectric loss, polarizability, mechanism of polarization,factors affecting polarization, polarization curve and hysteresis loop, types of dielectric materials, applications; ferroelectric, piezoelectric and pyroelectric materials, Clausius -Mosotti equation.

**Reference books**

1. Materials Science by M.Arumugam, Anuradha Publishers. 1990, Kumbakonam.
2.Materials Science and Engineering V.Raghavan, Printice Hall India Ed. V 2004. New Delhi.
3. Elementary Solid State Physics, 1/e M. Ali Omar, 1999, Pearson India
4. Solid State Physics, M.A. Wahab, 2011, Narosa Publications
.

## P.R. GOVERNMENT COLLEGE (A), KAKINADA
### III B.Sc  Physics Paper
### Elective Paper VII(B) – Semester – VI – Model Paper
w.e.f. 2016-17 ADMITTED BATCH

### 2018 - 2019.

**Course  Code : Elective B**                          **No. of credits : 03**

**Elective Paper VII(B):** Material science

**Note:-** Set the question paper as per the blue print given at the end of this model  paper.
Time: 3 Hrs.                                          Max. Marks: 70

| Section | Questions to be given | Questions to be answered | Marks |
|---------|-----------------------|--------------------------|-------|
| A | 6 | 4 | 4 x 10M = 40M |
| B | 10 | 6 | 6 x 5 M = 30M |
| Total | 16 | 10 | 70M |

## 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 | 1 | 2 | 20 |
| V | 1 | 2 | 20 |
| VI | 1 | 1 | 15 |
| | | Total | 110 |

**III B.Sc  Physics** Practical **– VIIB – Semester – VI**
w.e.f. 2016-17 ADMITTED BATCH

**2018 - 2019.**

## Material science

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

1.  Measurement of susceptibility of paramagnetic solution (Quinck`s Tube Method)

2.  Measurement of magnetic susceptibility of solids.

3.  Determination of coupling coefficient of a piezoelectric crystal.

4.  Measurement of the dielectric constant of a dielectric Materials

5.  Study the complex dielectric constant and plasma frequency of metal using surface

6.  plasmon resonance (SPR)

7.  Study the hysteresis loop of a Ferroelectric Crystal.

8.  Study the B-H curve of 'Fe' using solenoid and determine energy loss from hysteresis.

**2018 - 2019.**

Course  Code :                                              No. of credits : 03
**Elective Paper VII(C): Renewable Energy**

No. of Hours per week: 03                              Total Lectures:45

**UNIT-I (9 hrs)**
**Introduction to Energy:** Definition and units of energy, power, Forms of energy, Energy flow diagram to the earth. Role of energy in economic and social development.
**Environmental Effects:** Environmental degradation due to energy production and utilization, air and water pollution, depletion of ozone layer, global warming,

**UNIT-II (9hrs)**
**Global Energy Scenario:** Energy consumption in various sectors, energy resources, coal, oil, natural gas, nuclear and hydroelectric power.
**Indian Energy Scene:** Energy resources available in India, urban and rural energy consumption, nuclear energy - promise and future, need for use of new and renewable energy sources.

**UNIT-III (6hrs)**
**Solar energy:** Spectral distribution of radiation, solar water heating system, Applications, Solar cooker. Solar cell, Types of solar cells.

**UNIT-IV (6hrs)**
**Wind Energy:** Introduction, Principle of wind energy conversion, Components of wind turbines, Operation and characteristics of a wind turbine, Applications of wind energy.

**UNIT-V (8hrs)**
**Ocean Energy:** Introduction, Principle of ocean thermal energy conversion, Tidal power generation, Tidal energy technologies, Energy from waves.
**Hydrogen Energy:** Hydrogen production methods - Electrolysis of water, Uses of hydrogen as fuel.

**UNIT-VI (7 hrs)**
**Bio-Energy**
Energy from biomass – Sources of biomass – Conversion of biomass into fuels –Pyrolysis, gasification and combustion – Aerobic and anaerobic bio-conversion – Properties of biomass – Properties and characteristics of biogas.

**References:**

1. Solar Energy Principles, Thermal Collection &Storage, S.P.Sukhatme: Tata McGraw Hill Pub., New Delhi.

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

3. Renewable Energy, power for a sustainable future, Godfrey Boyle, 2004,

4. The Generation of electricity by wind, E.W. Golding.

5. Hydrogen and Fuel Cells: A comprehensive guide, Rebecca Busby, Pennwell corporation (2005)

6. Hydrogen and Fuel Cells: Emerging Technologies and Applications, B.Sorensen, Academic Press (2012).

7. Non-Conventional Energy Resources by B.H. Khan, Tata McGraw Hill Pub., 2009.

8. Fundamentals of Renewable Energy Resources byG.N.Tiwari, M.K.Ghosal, Narosa Pub., 2007.

## P.R. GOVERNMENT COLLEGE (A), KAKINADA
### III B.Sc Physics Paper – VIIB – Semester – VI – Model Paper
w.e.f. 2016-17 ADMITTED BATCH

**No. of credits : 03**

### Elective Paper VII(C): Renewable Energy

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

Time: 3 Hrs.                                          Max. Marks: 70

| Section | Questions to be given | Questions to be answered | Marks |
|---------|------------------------|---------------------------|-------|
| A | 6 | 4 | 4 x 10M = 40M |
| B | 10 | 6 | 6 x 5 M = 30M |
| Total | 16 | 10 | 70M |

### Blue Print

| Module | Essay Questions 10 marks | Short Questions 5 marks | Marks allotted |
|--------|---------------------------|--------------------------|----------------|
| I | 1 | 2 | 20 |
| II | 1 | 2 | 20 |
| III | 1 | 1 | 15 |
| IV | 1 | 2 | 20 |
| V | 1 | 1 | 15 |
| VI | 1 | 2 | 20 |
| Total | | | 110 |

**P.R. GOVERNMENT COLLEGE (A), KAKINADA**

**III B.Sc  Physics Practical – VIIC – Semester – VI**
w.e.f. 2016-17 ADMITTED BATCH

**Renewable Energy**
**Work load: 30 hrs**                                        **Duration: 2 hrs/week**
**No. of credits: 02**

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

1. Preparation of copper oxide selective surface by chemical conversion method.

2. Performance testing of solar cooker.

3. Determination of solar constant using pyrheliometer.

4. Measurement of I-V characteristics of solar cell.

5. Study the effect of input light intensity on the performance of solar cell.

6. Study the characteristics of wind.

7. Study the characteristics of photocell

**No. of credits : 03**

**Elective Paper VIII(B 1):** Fundamentals of Nanoscience

No. of Hours per week: 03                                    Total Lectures:45

UNIT-I (9hrs)
1. Background and history: Emergence of Nanoscience with special reference to Feynman and Drexler; Role of particle size; Spatial and temporal scale; Concept of confinement, strong and weak confinement with suitable example; Development of quantum structures, Basic concept of quantum well, quantum wire and quantum dot.
Finite size Zero, One and Two Dimensional Nanostructures, Concept of Surface and Interfacial Energies. Physics of the solid state – size dependence of properties, crystal structures, Lattice vibrations, Energy bands:- Insulators Semiconductors and conductors.

UNIT-II (9hrs)
2. Classification of Nanomaterials: Inorganic nanomaterials: carbon nanotubes and cones, Organic nanomaterials: dendrimers, micelles, liposomes, block copolymers; Bionanomaterials: Biomimtric, bioceramic and nanotherapeutics; Nanomaterials for molecular electronics and optoelectronics.

UNITS-III (9hrs)
3. Macromolecules: Classification of polymers, chemistry of polymerization, chain polymerization, step polymerization, coordination polymerization. Molecular weight of polymers-number average and weight average molecular weight, degree of polymerization, determination of molecular weight of polymers by viscometry,

UNIT-IV (9hrs)
4. Molecular & Nanoelectronics:Semiconductors, Transition from crystal technology to nanotechnology. Tiny motors, Gyroscopes and accelerometers. Nano particle embedded wrinkle resistant cloth, Transparent Zinc Oxide sun screens.

UNIT-V (9hrs)
5. Biomaterials: Implant materials: Stainless steels and its alloys, Ti and Ti based alloys, Ceramic implant materials; Hydroxyapatite glass ceramics, Carbon Implant materials, Polymeric Implant materials, Soft tissue replacement implants, Sutures, Surgical tapes and adhesives, heart valve implants, Artificial organs, Hard Tissue replacement Implants, Internal Fracture Fixation Devices, Wires, Pins, and Screws, Fracture Plates.

Reference Books

1. T. Pradeep: Textbook of Nanoscience and Nanotechnology Chapter (McGraw-Hill Professional, 2012), Access Engineering.
2. C. N. R. Rao, A. Mu¨ller, A. K. Cheetham, "The Chemistry of Nanomaterials :Synthesis, Properties and Applications", Wiley-VCH, 2006.
3. C. Breachignac P. Houdy M. Lahmani, "Nanomaterials and Nanochemistry", Springer, 2006.
4. Guozhong Cao, "Nanostructures and Nanomaterials: Synthesis, Properties, and Applications", World Scientific Publishing Private, Ltd., 2011.
5. Zhong Lin Wang, "Characterization of Nanophase Materials", Wiley-VCH, 2004.
6. Carl C. Koch, "Nanostructured Materials: Processing, Properties and Potential Applications", William Andrew Publishing Norwich, 2006. ANNEXURE – II(a)

## P.R. GOVERNMENT COLLEGE (A), KAKINADA

w.e.f. 2016-17 ADMITTED BATCH
### III B Sc Elective Paper VIII(B 1): Fundamentals of Nanoscience

### No. of credits : 03

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

Time: 3 Hrs.                                    Max. Marks: 70

| Section | Questions to be given | Questions to be answered | Marks |
|---------|----------------------|--------------------------|-------|
| A | 6 | 4 | 4 x 10M = 40M |
| B | 10 | 6 | 6 x 5 M = 30M |
| Total | 16 | 10 | 70M |

## Blue Print

| Module | Essay Questions 10 marks | Short Questions 5 marks | Marks allotted |
|--------|--------------------------|-------------------------|----------------|
| I | 1 | 2 | 20 |
| II | 1 | 2 | 20 |
| III | 1 | 1 | 15 |
| IV | 1 | 2 | 20 |
| V | 1 | 1 | 15 |
| VI | 1 | 2 | 20 |
| Total | | | 110 |

**III B.Sc Physics Practical – VIII (B 1) – Semester – VI**
W.e.f. 2016-17 ADMITTED BATCH

Fundamentals of Nan science

**Credits: 02**                                    **Duration: 2hrs/Week**

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

1. Determination of the Band Gap of Semiconductor Nan particles.
2. Surface Enhanced Raman Scattering Activity of Silver Nan particles
3. Conversion of Gold Nano rods into Gold Nan particles
4. Bimetallic Nan particles
5. Processing and Development of Nan particle gas sensor
6. Magnetic separation/identification studies of nano particles
7. Harvesting light using nano-solar cells
8. Nano-Forensic analysis to identify, individualize and evaluate evidence using nano phase materials
9. Comparison of the performance of nano particles based conductive adhesives and conventional non conductive adhesives.
10. Electrode position and corrosion behavior of nano structured composite film
11. Photo catalytic activity of nano materials

# P.R. GOVERNMENT COLLEGE (A), KAKINADA

**III Bask Physics** Elective Paper VIII (B 2) – **Semester – VI**
W.e.f. 2016-17 ADMITTED BATCH

**Course Code: Cluster Elective VIII (B2)**          **No. of credits: 03**

**Synthesis and Characterization of Nano materials**

No. of Hours per week: 03                          Total Lectures: 45

Unit-I (9 hrs)

1. Nano materials synthesis: Synthesis and nano fabrication, Bottom-Up and Top-Down approach with examples. Chemical precipitation methods, sol-gel method, chemical reduction, hydrothermal, process. Physical Methods- ball milling, Physical Vapour deposition (PVD), Sputtering, Chemical Vapor deposition (CVD), pray pyrolysis,

Unit-II (9 hrs)

2. Classification of materials: Types of materials, Metals, Ceramics (Sand glasses) polymers, composites, semiconductors. Metals and alloys- Phase diagrams of single component, binary and ternary systems, diffusion, nucleation and growth.

UNITS-III (9 hrs)

3. Glasses: The glass transition - theories for the glass transition, Factors that determine the glass-transition temperature. Glass forming systems and ease of glass formation, preparation of glass materials. Applications of Glasses: Introduction: Electronic applications, Electrochemical applications, optical applications, Magnetic applications.

UNITS-IV (9 hrs)

4. Liquid Crystals: Mesomorphism of anisotropic systems, Different liquid crystalline phase and phase transitions, Thermal and electrical properties of liquid crystals, Types Liquid Crystals displays, few applications of liquid crystals.

UNITS-V (9 hrs)

5. Characterization Methods: XRD, SEM, TEM, AFM, XPS and PL characterization

techniques for nano materials.

**References books**

1. Encyclopedia of Nanotechnology by M.Balakrishna Rao and K.Krishna Reddy, Vol.I to X, Campus books.

2. Nano: The Essentials-Understanding Nano science & Nanotechnology by T.Pradeep; Tata Mc. Graw Hill

3. Nanotechnology in Microelectronics & Optoelectronics, J.M Martine Duart, R.J Martin Palma, F. Agullo Rueda, Elsevier

4. Nano electronic Circuit Design, N.K Jha, D Chen, Springer

5. Handbook of Nano physics- Nano electronics & Nano photonics, K.D Sattler, CRC Press

6. Organic Electronics-Sensors & Biotechnology- R. Shinar & J. Shinar, McGraw-Hill

**III B.Sc Physics** Elective Paper VIII(B 2)– **Semester - VI**

**No. of credits : 03**

**Note:-** Set the question paper as per the blue print given at the end of this model  paper.
Time: 3 Hrs.                                                          Max. Marks: 70

| Section | Questions to be given | Questions to be answered | Marks |
|---------|-----------------------|--------------------------|-------|
| A | 6 | 4 | 4 x 10M = 40M |
| B | 10 | 6 | 6 x 5 M = 30M |
| Total | 16 | 10 | 70M |

**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 | 1 | 2 | 20 |
| V | 1 | 1 | 15 |
| VI | 1 | 2 | 20 |
| Total | | | 110 |

**P.R. GOVERNMENT COLLEGE (A), KAKINADA**

**III B.Sc Physics Practical – VIII (B 2) – Semester – VI**
W.e.f. 2016-17 ADMITTED BATCH

**Cluster Elective: VIII (B2) - Synthesis and Characterization of Nano materials**

**Credits: 02**                                **Duration: 2hrs/Week**

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

1. Synthesis of nano crystalline films of II-VI compounds doped with rare earths by chemical process.

2. Synthesis of Alkaline earth aluminates in nano crystalline form by combustion synthesis.

3. Preparation of surface conducting glass plate by spray pyrolysis method

4. Preparation of surface conducting glass plate by chemical route

5. Fabrication of micro fluidic nano filter by polymerisation reaction

6. Absorption studies on the nano crystalline films and determination of absorption coefficient.

7. Determination of band gap from the absorption spectra using Tauc's plots.

8. Study of Hall Effect in semiconductors and its application in nanotechnology.

9. Measurement of electrical conductivity of semiconductor film by Four Probe method and study of temperature variation of electrical conductivity.

## P.R. GOVERNMENT COLLEGE (A), KAKINADA
### III B.Sc Physics Paper – VIII(C) – Semester – VI
w.e.f. 2016-17 ADMITTED BATCH

**Course Code : Elective Paper VIII(C 1)**             **No. of credits : 03**

### Elective Paper VIII(C 1): Solar Thermal and Photovoltaic Aspects

**No. of Hours per week: 03**                          **Total Lectures:45**

**UNIT-I (5 hrs)**
**1. Basics of Solar Radiation:** Structure of Sun, Solar constant, Concept of Zenith angle and air mass, Definition of declination, hour angle, solar and surface azimuth angles; Direct, diffuse and total solar radiation, Solar intensity measurement –pyrheliometer.

**UNIT – II (5 hrs)**
**2. Radiative Properties and Characteristics of Materials:** Kirchoff's law – Relation between absorptance, emittance and reflectance; Selective Surfaces - preparation and characterization, Types and applications; Anti-reflective coating.

**UNIT-III (8 hrs)**
**3. Flat Plate Collectors (FPC) :** Description of flat plate collector, Liquid heating type FPC, Energy balance equation, Efficiency, Temperature distribution in FPC, Definitions of fin efficiency and collector efficiency, Evacuated tubular collectors.

**Unit-IV (9 hrs)**
**4. Solar photovoltaic (PV) cell:** Physics of solar cell –Type of interfaces, homo, hetero and schottky interfaces, Photovoltaic Effect, Equivalent circuit of solar cell, Solar cell output parameters, Series and shunt resistances and its effect on cell efficiency; Variation of efficiency with band-gap and temperature.

**UNIT-V (9 hrs)**
**5. Solar PV systems:** Solar cell module assembly – Steps involved in the fabrication of solar module, Module performance, I-V characteristics, Modules in series and parallel, Module protection –Solar PV system and its components, PV array, inverter, battery and load.

**UNIT-VI (9 hrs)**
**6. Solar thermal applications:** Solar hot water system (SHWS), Types of SHWS, Standard method of testing the efficiency of SHWS; Passive space heating and cooling concepts, Solar desalinator and drier, Solar thermal power generation.

**Reference Books:**

1. Solar Energy Utilization, G. D. Rai, Khanna Publishers
2. Solar Energy- Fundamentals, design, modeling and applications, G.N. Tiwari, Narosa Pub., 2005.
3. Solar Energy-Principles of thermal energy collection & storage, S.P. Sukhatme,TataMc-Graw Hill Publishers, 1999.
4. Solar Photovoltaics- Fundamentals, technologies and applications, Chetan Singh Solanki, PHI Learning Pvt. Ltd.,
5. Science and Technology of Photovoltaics, P. Jayarama Reddy, BS Publications, 20

**Cluster Elective Paper VIII(C 1): Solar Thermal and Photovoltaic Aspects**

**No. of credits : 03**

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

Time: 3 Hrs.                                                                 Max. Marks: 70

| Section | Questions to be given | Questions to be answered | Marks |
|---------|----------------------|--------------------------|-------|
| A | 6 | 4 | 4 x 10M = 40M |
| B | 10 | 6 | 6 x 5 M = 30M |
| Total | 16 | 10 | 70M |

### Blue Print

| Module | Essay Questions 10 marks | Short Questions 5 marks | Marks allotted |
|--------|--------------------------|-------------------------|----------------|
| I | 1 | 1 | 15 |
| II | 1 | 1 | 15 |
| III | 1 | 2 | 20 |
| IV | 1 | 2 | 20 |
| V | 1 | 2 | 20 |
| VI | 1 | 2 | 20 |
| Total | | | 110 |

**P.R. GOVERNMENT COLLEGE (A), KAKINADA**

**III B.Sc Physics Practical – VIII (C 1) – Semester – VI**
W.e.f. 2016-17 ADMITTED BATCH

**Cluster Elective: VIII (C1) - Solar Thermal and Photovoltaic Aspects**

**Credits: 02**                                              **Duration: 2hrs/Week**

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

1. Measurement of direct solar radiation using pyrheliometer.

2. Measurement of global and diffuse solar radiation using pyrano meter.

3. Measurement of emissivity, reflectivity and transsivity.

4. Measurement of efficiency of solar flat plate collector.

5. Performance testing of solar air dryer unit.

6. Effect of tilt angle on the efficiency of solar photovoltaic panel.

7. Study on solar photovoltaic panel in series and parallel combination.

**P.R. GOVERNMENT COLLEGE (A), KAKINADA**

**III B.Sc  Physics Paper – VIII(C 2) – Semester – VI**
w.e.f. 2018-19 ADMITTED BATCH
**Course  Code :   Cluster Elective VIII(C 2)**                      No. of credits : 03

**Cluster Elective Paper VIII(C 2): Wind, Hydro and Ocean Energies**

**No. of Hours per week: 03**                                    **Total Lectures:45**

**UNIT-I(8hrs)**
**1. Introduction:** Wind generation, meteorology of wind, world distribution of wind, wind speed variation with height, Wind speed Statistics, Wind energy conversion principles; General introduction; Types and classification of WECS.

**UNIT-II(9hrs)**
**2.** Wind Energy Conversion System: Aerodynamic design principles; Aerodynamic theories; Axial momentum, blade element; Rotor characteristics; Maximum power coefficient.

UNIT-III(9hrs)
**3.** Wind Energy Application: Wind pumps: Performance analysis, design concept and testing; Principle of wind energy generation; Wind energy in India; Environmental Impacts of Wind farms.

**UNIT-IV(9hrs)**
**4.** Small Hydropower Systems: Overview of micro, mini and small hydro systems; Hydrology; Site selection; Speed and voltage regulation.

**UNIT-V(5hrs)**
**5.** Ocean Thermal, Tidal and Wave Energy Systems: Ocean Thermal - Introduction,  working principle, Electricity generation methods from OCET, Advantages and disadvantages, Applications of OTEC.

**UNIT-VI(5hrs)**
**6.** Tidal Energy - Introduction, Origin and nature of tidal energy, Wave Energy – Introduction, Wave energy conversion devices, Advantages and disadvantages, Applications of wave energy.

**Reference Books:**

1. Dan Charis, Mick Sagrillo, LanWoofenden, "Power from the Wind", New Society Pub., 2009.
2. Erich Hau, "Wind Turbines-Fundaments, Technologies, Applications, Economics", 2ndEdition, Springer Verlag, BerlinHeidelberg, NY, 2006.
3. Joshue Earnest, Tore Wizelius, Wind Power and Project Developmen", PHI Pub., 2011.
4. T. Burton, D. Sharpe, N. Jenkins, E. Bossanyi, Wind Energy Handbook, John Wiley Pub., 2001.
5. Paul Gipe, "Wind Energy Basics", Chelsea Green Publications, 1999.
6. Khan, B.H., "Non-Conventional Energy Resources", TMH, 2nd Edition, New Delhi, 2009.
7. Tiwari, G.N., and Ghosal, M.K, Renewable Energy Resources – Basic Principles and applications, Narosa Publishing House,2007.

**Cluster Elective Paper VIII(C 2): Wind, Hydro and Ocean Energies**

**Course  Code :  Cluster Elective VIII(C 2)**           **No. of credits : 03**

**Note:-** Set the question paper as per the blue print given at the end of this model  paper.
Time: 3 Hrs.                                      Max. Marks: 70

| Section | Questions to be given | Questions to be answered | Marks |
|---------|-----------------------|--------------------------|-------|
| A | 6 | 4 | 4 x 10M = 40M |
| B | 10 | 6 | 6 x 5 M = 30M |
| Total | 16 | 10 | 70M |

## Blue Print

| Module | Essay Questions 10  marks | Short Questions 5 marks | Marks allotted |
|--------|---------------------------|-------------------------|----------------|
| I | 1 | 2 | 20 |
| II | 1 | 2 | 20 |
| III | 1 | 2 | 20 |
| IV | 1 | 1 | 15 |
| V | 1 | 1 | 15 |
| VI | 1 | 2 | 20 |
| Total | | | 110 |

**P.R. GOVERNMENT COLLEGE (A), KAKINADA**
**III B.Sc  Physics  Practical – VIII (C 2) – Semester – VI**
w.e.f. 2016-17 ADMITTED BATCH

**Cluster Elective: VIII (C2) - Wind, Hydro and Ocean Energies**

**Credits : 02**                                        **Duration: 2hrs/Week**

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

1.  Estimation of wind speed using anemometer.

2.  Determination of characteristics of a wind generator

3.  Study the effect of number and size of blades of a wind turbine on electric power output.

4.  Performance evaluation of vertical and horizontal axes wind turbine rotors.

5.  Study the effect of density of water on the output power of hydroelectric generator.

6.  Study the effect of wave amplitude and frequency on the wave energy generated.

**P.R. GOVERNMENT COLLEGE (A), KAKINADA**

**DEPARTMENT OF PHYSICS & ELECTRONICS**

**WORK LOAD FOR THE YEAR 2019 - 20**

Name of the Subject          : PHYSICS

Total No. of Hours           : **164**

No. of Permanent posts sanctioned   : 09

No. of Permanent staff working     : 03+01

| S. No | Strength | Name of the class | Theory hours | Practical Hours | No. of Batches | Total Practical Hours | Total hrs.(Theory + Practical) |
|---|---|---|---|---|---|---|---|
| 1 | 60 | I MPC TM | 4 | 2 | 4 | 8 | 12 |
| 2 | 30 | I MPC EM | 4 | 2 | 2 | 4 | 8 |
| 3 | 30 | I MPE | 4 | 2 | 2 | 4 | 8 |
| 4 | 30 | I MPCS | 4 | 2 | 2 | 4 | 8 |
| 5 | 60 | II MPC TM | 4 | 2 | 4 | 8 | 12 |
| 6 | 30 | I IMPC EM | 4 | 2 | 2 | 4 | 8 |
| 7 | 30 | I IMPE | 4 | 2 | 2 | 4 | 8 |
| 8 | 30 | I IMPCS | 4 | 2 | 2 | 4 | 8 |
| 9 | 60 | I IIMPC TM      Sem V   Paper V | 3 | 2 | 4 | 8 | 11 |
| 10 | 60 | I IIMPC TM      Sem V  Paper VI | 3 | 2 | 4 | 8 | 11 |
| 11 | 30 | I IIMPC EM      Sem V  Paper V | 3 | 2 | 2 | 4 | 7 |
| 12 | 30 | I IIMPC EM      Sem V  Paper VI | 3 | 2 | 2 | 4 | 7 |
| 13 | 30 | I II MPE        Sem V  Paper V | 3 | 2 | 2 | 4 | 7 |
| 14 | 30 | I II MPE        Sem V  Paper VI | 3 | 2 | 2 | 4 | 7 |
| 15 | 30 | II IMPCS        Sem V  Paper V | 3 | 2 | 2 | 4 | 7 |
| 16 | 30 | II IMPCS        Sem V  Paper VI | 3 | 2 | 2 | 4 | 7 |
| 17 | 30 | Cluster        Sem VI Paper VII A | 3 | 2 | 2 | 4 | 7 |
| 18 | 30 | Cluster        Sem VI Paper VIII A | 3 | 2 | 2 | 4 | 7 |
| 19 | 30 | Cluster        Sem VI Paper VIII B | 3 | 2 | 2 | 4 | 7 |
| 20 | 30 | Cluster        Sem VI Paper VIII C | 3 | 2 | 2 | 4 | 7 |
| | | | | | | | |
| **Total Work load for the department of PHYSICS** | | | | | | | **164** |

# DEPARTMENT OF PHYSICS & ELECTRONICS

## WORK LOAD FOR THE YEAR 2018-19

Name of the Subject          : ELECTRONICS

Total No. of Hours          : **88**

| | Strength | Name of the class | | Theory hours | Practical Hours | No. of Batches | Total Practical Hours | Total hrs.(Theory + Practical) |
|---|---|---|---|---|---|---|---|---|
| 1 | 30 | I MPE | | 4 | 2 | 2 | 4 | 8 |
| 2 | 30 | I MECS | | 4 | 2 | 2 | 4 | 8 |
| 3 | 30 | II MPE | | 4 | 2 | 2 | 4 | 8 |
| 4 | 30 | II MECS | | 4 | 2 | 2 | 4 | 8 |
| 5 | 30 | III MPE | Sem V Paper V | 3 | 2 | 2 | 4 | 7 |
| 6 | 30 | III MPE | Sem V Paper VI | 3 | 2 | 2 | 4 | 7 |
| 7 | 30 | III MECS | Sem V Paper V | 3 | 2 | 2 | 4 | 7 |
| 8 | 30 | III MECS | Sem V Paper VI | 3 | 2 | 2 | 4 | 7 |
| 9 | 30 | Cluster A | Sem VI Paper VII | 3 | 2 | 2 | 4 | 7 |
| 10 | 30 | Cluster A | Sem VI Paper VIII | 3 | 2 | 2 | 4 | 7 |
| 11 | 30 | Cluster B | Sem VI Paper VIII | 3 | 2 | 2 | 4 | 7 |
| 12 | 30 | Cluster C | Sem VI Paper VIII | 3 | 2 | 2 | 4 | 7 |
| | | | | | | | | |
| | | **Total Work load for the department of ELECTRONICS** | | | | | | **88** |

**15**

**DEPARTMENT OF PHYSICS & ELECTRONICS**

**WORK LOAD FOR THE YEAR 2018-19**

Name of the Subject            : **M Sc., Physics**

Total No. of Hours            : **46**

| S. No | Strength | Name of the class | Theory hours | Practical Hours | No. of Batches | Total Practical Hours | Total hrs.(Theory + Practical) |
|---|---|---|---|---|---|---|---|
| 1 | 30 | I M Sc | 20 | 3 | 1 | 3 | 23 |
| 2 | 30 | II MSc | 20 | 3 | 1 | 3 | 23 |
| | | **Total Work load for  M Sc Physics** | | | | | **46** |

## Consolidated Work Load for the Academic Year 2018-19

| Group | Work Load | Staff Required |
|---|---|---|
| Physics | 164 | 8 |
| Electronics | 88 | 4 |
| M Sc | 46 | 2 |
| Total Work Load | **298** | **14** |

**P.R. GOVERNMENT COLLEGE (A), KAKINADA**

**II B.Sc., Physics – Semester - IV**
**2018 - 2019**

**Course Code :**                    **No. of credits : 02**         <u>Solar</u>

# <u>Power Design & System Integration</u>

## **(Add-on course)**

<u>**2 Hour/Week**</u>                                      <u>**Total Hours : 50**</u>

<u>**Module – 1(10 hrs)**</u>

**Basic electronics**:-Atomic Structure - Semi Conductor Materials - Doping -Silicon N Channel-Silicon P Channel - PN Junction - Biasing-PN Junction as closed Switch-PN Junction as open Switch-Voltage-Current-Power-Solar Cells-Solar Modules

<u>**Module – 2(10 hrs)**</u>

**Solar modules**: Standard Voltage Ratings of a Solar Module - Power Rating Of A Solar Module - Designing Of a Solar Module - Calculations of Power Generation through Solar Modules - Calculations on Energy Requirements.

<u>**Module – 3 (10 hrs)**</u>

**Assembling of solar cell**:  Designing of Solar Power Packs - Solar Street Lights - Circuit Ideas on Control Systems - Designing of Battery Bank - Primary & Secondary Cells - Construction Of La Battery – Banking - Maintenance & Repairs

<u>**Module – 4 (10 hrs)**</u>

**Solar cell maintenance**: Solar Power Conditioning unit - MPPT Charge Controller - Dusk To Dawn Operation Sensors - Max. Load Design on PCU - Calculation of Savings from Solar Power Plant - Maintenance & operational Guidelines to user - Service & Repairs of Solar Plant.

<u>**Module – 5 (10 hrs)**</u>

**Solar panel standards:** Micro-Controller – Introduction - Control Logics on Power Systems - Fail Safe Techniques - Standards of Materials - IEC Standards - Standard Levels of Installation & Erection

<u>Text books & Reference books</u>

1. Grob's Basic Electronics - Mitchel E.Schultz  10$^{th}$ Edn. Tata McGraw Hill (TMH)
2. A First course in Electronics- AA Khan & KK Day-  PHI
3. Basic Electronics                                D.C. Tayal
4. Basic Electronics                          Grobb
5. Solar Photovoltaics: Fundamentals, Technologies and Applications
   By <u>Solanki Chetan Singh</u>
6. Solar Panel Efficiency Enhancement [Import]
   By <u>Riasad Amin</u> (Author), <u>MD Ali Imam Hossain</u> (Author), <u>Mowdudur Rahman</u>
   <u>Dewan</u> (Author)
7. Solar Cell Technology and Applications
   By A. R. Jha
8. Solar Photovoltaics: Fundamentals Technologies And Applications
   By Solank
9. Optoelectronics of Solar Cells
   By Greg P. Smesta
10. Thin Film Solar Cells: Fabrication, Characterization and Applications
    By Jef Poortmans, Vladimir Arkhipov
11. Practical photovoltaics: electricity from solar cells
    By Richard J. Komp
    Aatec Publications
12. Dye-sensitized Solar Cells
    By K. Kalyanasundaram
13. Physics and Technology of Amorphous-Crystalline Heterostructure Silicon ...
    By Wilfried G. J. H. M. van Sark, Lars Korte, Francesco Roca

**II B.Sc.,  Physics  – Semester – IV (Model Paper)**
**2018 - 2019.**

**Course Code :**                                                   **No. of credits : 02**

# Solar Power Design & System Integration

### (Add-on course)

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

Time:  3 Hrs.                                                         Max. Marks: 70

### Section – A

Answer any **THREE** questions.                                    3 x 15 = 45 m.

| Section | Questions to be given | Questions to be answered | Marks |
|---------|----------------------|--------------------------|-------|
| A | 4 | 3 | 3 x 15M = 45M |
| B | 8 | 5 | 5 x 5 M = 25M |
| Total | 12 | 8 | 70M |

### Blue Print

| Module | Essay Questions 15  marks | Short Questions 5 marks | Marks allotted |
|--------|---------------------------|--------------------------|----------------|
| Basic electronics | 1 | 02 | 25 |
| Solar modules | - | 02 | 10 |
| Assembling of solar cell | 1 | 1 | 20 |
| Solar cell maintenance | 1 | 1 | 20 |
| Solar panel standards | 1 | 02 | 25 |
| Total | | | 100 |

# P R GOVT COLLEGE (A), KAKINADA

## LIST OF EXAMINERS/ PAPER SETTERS IN PHYSICS

## 2019 - 20

| 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 for Women, Gavaravaram, Eluru |
| 3 | R.Venkateswararao 9440119231 | Physics | M.S.N.Charties, Kakinada |
| 4 | Dr.G.Sankaranarayana Rao 9441207220 | Physics | V.S.Krishna College, Visakhapatnam |
| 5 | Dr.R.Kanna Rao  9397347713 | Physics | Principal, Mrs.A.V.N.College, Visakhapatnam |
| 6 | Dr.S.Srinivasarao 9849057189 | Physics | Mrs.A.V.N.College, Visakhapatnam |
| 7 | K.Ananda Rao | Physics | C.R.R. College (M), Eluru |
| 8 | K.Ramesh | Physics | C.R.R. College (M) Eluru |
| 9 | K.B.S.Gopal | Physics | C.R.R. College (M) Eluru |
| 10 | P.P.Divakar | Physics | C.R.R. College (M) Eluru |
| 11 | A.Veerabhadra Rao | Physics | C.R.R. College (M) Eluru |
| 12 | L.S.R.Ch.V.K.Nageswararao | Physics | C.R.R. College (M) Eluru |
| 13 | R.Suryanarayana Raju | Physics | K.G.R.L.College , Bhimavaram |
| 14 | Smt.V.Vidyamallika | Physics | K.G.R.L.College , Bhimavaram |
| 15 | P.Rajyalakshmi | Physics | C.R.R. College (W), Eluru |
| 16 | K.Sireesha | Physics | C.R.R. College (W), Eluru |
| 17 | M.Jayalakshmi Devi | Physics | C.R.R. College (W), Eluru |
| 18 | P.Himakar | Physics | S.K.B.R.College, Amalapuram |
| 19 | N.S.Satyanarayana Murthy | Physics | S.K.B.R.College, Amalapuram |
| 20 | K.Nagavarma | Physics | S.K.B.R.College, Amalapuram |
| 21 | V.V.Subba Rao | Physics | S.K.B.R.College, Amalapuram |

| S.No. | Name of the examiner | Subject | Name of the College |
|---|---|---|---|
| 22 | J.Prabhakara Rao | Physics | S.K.B.R.College, Amalapuram |
| 23 | S.V.Kumara  Sastry | Physics | S.K.B.R.College, Amalapuram |
| 24 | V.Radha Krishna | Physics | S.K.B.R.College, Amalapuram |
| 25 | K.Srinivasa Rao | Physics | Govt. College , Kotha peta |
| 26 | Valluri Srinivasa Rao | Physics | Govt. College (women) Nidadavolu |
| 27 | T.K.Visweswara Rao | Physics | Govt. College( women), Nidadavolu |
| 28 | E.Nageswara Rao | Physics | Govt. College (A), |
| 29 | Dr.K.Ramachandra Rao | Physics | Govt. College (A), Rajahmundry |
| 30 | EsubBasha Sheik | Physics | Govt. College (A), Rajahmundry |
| 31 | Dr.B.V.Tirupanyam | Physics | Govt. College , Narayanapuram |
| 32 | Vobhilineni Srinivasa Rao | Physics | Govt. College , Ramachandrapuram |
| 33 | N LV R K Prasad | Physics | Govt. College , Ramachandrapuram |
| 34 | P.S. Brahamachari | Physics | Govt. College , Tadepalligudem |
| 35 | K.Ganesh Kumar | Physics | Govt. College , Tadepalligudem |
| 36 | P. V. L.Narayana | Physics | GDC Tanuku |
| 37 | M.Sudhadhar | Physics | GDC Tanuku |
| 38 | B.DurgaLakshmi | Physics | GDC Tanuku |
| 39 | T.Y.H.A.G.Gandhi | Physics | Govt. College , Ravulupalem |
| 40 | Dr. A.R.S. Kumar, Reader | Physics | Y.N. College (A), Narasapur |
| 41 | A.P.V. Appa Rao | Physics | Y.N. College (A), Narasapur |
| 42 | J. Rammohan | Physics | Y.N. College (A), Narasapur |
| 43 | P. Rama Krishna Rao | Physics | Y.N. College (A), Narasapur |

P. R .

GOVERNMENT COLLEGE (A), KAKINADA

Department of Physics & Electronics
Departmental Activities Planned for 2018-2019

The department of Physics and Electronics is planning the following programmes to conduct for the academic year 2018 –19.

| S. No. | Activity | Probable date | Remarks |
|---|---|---|---|
| 1 | Counseling session for all classes of I year.<br>a) About curriculum<br>b) About semester system<br>c) CBCS system<br>d) About examination system<br>e) About co curricular activities<br>f) About extra curricular activities<br>g) About extension activities<br>h) About carrier guidance | June 4th week | |
| 2 | Post admission test | July 1st week | |
| 3 | Inaugural function of Physics Association<br>a) To explain aims and objectives of dept.,<br>b) To start UPKAR SCHEME<br>c) Helping hands | July 1st week | |
| 4 | Guest Lecture | July 3rd week | |
| 5 | Local Field trip surrounding industries, Awareness programme on IMD and importance | August 2nd week | |
| | One day work shop on Research Orientation in Physics | August 4th week | |
| 6 | Extension activity to local high schools | September 2nd week | |
| 7 | UPKAR scheme – disbursement of money to the students for their semester end examinations. | September 4th week | |
| 8 | Celebration of Sir C.V.Raman's Birth day | November 7th | |
| 9 | Guest lecture | November 3rd week | |
| 10 | College Quiz programme | December 2nd week | |
| 11 | Helping hands programme | January 1st week | |
| 12 | School level and college level Competitions with in the district for two days to inculcate awareness in science and technology | February 3rd week | |
| 13 | National Science day celebrations | February 28th | |
| 14 | UPKAR scheme – disbursement of money | March 1st week | |

*Physics 2018 - 19*

| | | | |
|---|---|---|---|
| | to the students for their semester end examinations. | | |

# **Certificate**

The syllabus and model question papers including **Blue – Print** in Physics subject for 3 years B.Sc. course for the semester I, II, III, IV, V and VI for the academic     year **2018-19**, list of examiners and paper setters, departmental activities which contains pages **64**, is approved in the Board of Studies meeting held in the Department of Physics and Electronics on **10- 04 - 2018**.

| | **Members of Board of Studies** | | **Signatures of members** |
|---|---|---|---|
| 1 | Dr. K. Jyothi | Chair person | |
| 2 | Dr. K. Srinivasa Rao | University nominee Lec.in charge / phy/V.S.M College, Ramachandrapuram. | |
| 3 | Dr. M.V.K.Meher | Subject Expert, Lec.in charge/ phy/Govt. College, Alamuru. | |
| 4 | Sri S.S.R  Murthy | Subject Expert, Lec.in charge/ phy/Ideal Degree College, Kakinada. | |
| 5 | Sri A.V.V .V. Prasad | Representative from Industry, solar systems , Kakinada. | |
| 6 | Dr. K. Nanda Gopal | Alumni | |
| 7 | Sri. U.V.B.B.Krishna Prasad | Member | |
| 8 | Sri. K. Jaya Dev | Member | |
| 9 | Sri B.Srikanth | Member | |

| 10 | Sri S P Raju | Member | |
|----|--------------|--------|---|
| 11 | M. Rama swamy | Student III MPE | |
| 12 | A. Asha jyothi | Student III MPCs | |
| 13 | G. Shankar | Student II MPC EM | |
| 14 | K. Maheswari | Student II MPC EM | |

From

Dr. K. Jyothi
In-charge
Department of Physics
P.R.Govt. College (A),
Kakinada.

To

The Principal,
P.R.Govt. College (A),
Kakinada.

Sir,

SUB:  Submission of the bills for BOS meetings for the subjects Physics and Electronics –
Reimbursement of Amount--request – Reg.

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I hereby submit 18 vouchers\bills (Physics -9 and Electronics - 9) for an amount of Rs. 15130/- (Physics -6480/- and Electronics – Rs. 8640/-) which was spent by me for BOS meetings in Physics and Electronics on 10-04-2018. I am here with enclosing a statement showing the said expenditure for your kind perusal.

| S. No. | Subject | Expenditure | To be reimbursed |
|--------|---------|-------------|------------------|
| 1 | Physics | Rs. 4360/- | Rs. 4360/- |
| 2 | | Rs. 2120/- | Rs.2120/- |
| 3 | Electronics | Rs. 6330/- | Rs. 6330/- |
| 4 | | Rs. 2320/- | Rs. 2320/- |
| **TOTAL** | | **Rs. 15130/-** | **Rs. 15130/-** |

Thanking you Sir

Yours faithfully,

## STATEMENT FOR EXPENDITURE

### PHYSICS BOS Bills
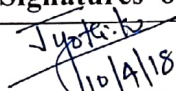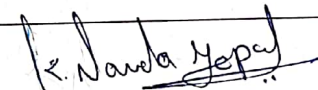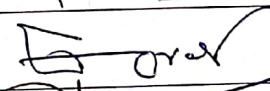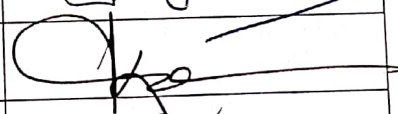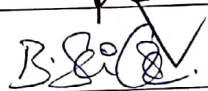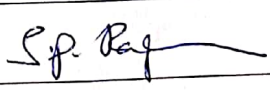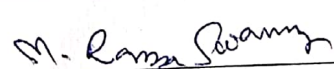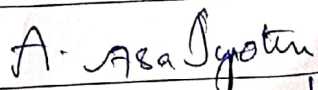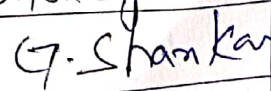
| S.No. | Voucher no./Bill no. | Description | Amount |
|-------|---------------------|-------------|--------|
| 1 | P 1, P2 | T.A., D.A. and Sitting Allowance to Dr.K. Srinivasa Rao | 1250 + 500 = 1750 |
| 2 | P3, P4 | T.A., D.A. and Sitting Allowance to Dr.M.V.K. Meher | 610 + 500=1110 |
| 3 | P5 | Sitting Allowance to S.S.R. Murthy | 500 |
| 4 | P6 | Sitting Allowance to  AVVV Prasad. | 500 |
| 5 | P7 | Sitting Allowance to K. Nanda gopal | 500 |
| 6 | P8 | Xerox and Spiral Binding | 1070 |
| 7 | P9 | Hospitality | 1050 |
|  |  | Total | **6480** |

### Electronics BOS Bills

| S.No. | Voucher no./Bill no. | Description | Amount |
|-------|---------------------|-------------|--------|
| 1 | S 1, S2 | T.A., D.A. and Sitting Allowance to Dr. YVV Appa Rao | 2250+500 = 2750 |
| 2 | S3, S4 | T.A., D.A. and Sitting Allowance to D. Gangadharudu | 510+500=1010 |
| 3 | S5 | T.A., D.A. and Sitting Allowance to NLVRK Prasad | 1070 + 500 = 1570 |
| 4 | S6 | Sitting Allowance to B. Sudarshan | 500 |
| 5 | S7 | Sitting Allowance to P. Rambabu | 500 |
| 6 | S8 | Xerox & Spiral | 1200 |
| 7 | S9 | Hospitality | 1120 |
|  |  | Total | **8650** |

# Certificate

The syllabus and model question papers including **Blue – Print** in Physics subject for 3 years B.Sc. course for the semester I, II, III, IV, V and VI for the academic year **2018-19**, list of examiners and paper setters, departmental activities which contains pages **64**, is approved in the Board of Studies meeting held in the Department of Physics and Electronics on **10- 04 - 2018**.

| | Members of Board of Studies | | Signatures of members |
|---|---|---|---|
| 1 | Dr. K. Jyothi | Chair person | Jyoti.k 10/4/18 |
| 2 | Dr. K. Srinivasa Rao | University nominee Lec.in charge / phy/V.S.M College, Ramachandrapuram. | K. |
| 3 | Dr. M.V.K.Meher | Subject Expert, Lec.in charge/ phy/Govt. College, Alamuru. | |
| 4 | Sri S.S.R Murthy | Subject Expert, Lec.in charge/ phy/Ideal Degree College, Kakinada. | |
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| 6 | Dr. K. Nanda Gopal | Alumni | K. Nanda Yepal |
| 7 | Sri. U.V.B.B.Krishna Prasad | Member | |
| 8 | Sri. K. Jaya Dev | Member | |
| 9 | Sri B.Srikanth | Member | B.Sri |
| 10 | Sri S P Raju | Member | S.P. Raj |
| 11 | M. Rama swamy | Student III MPE | M. Rama Swamy |
| 12 | A. Asha jyothi | Student III MPCs | A. Asa Jyothi |
| 13 | G. Shankar | Student II MPC EM | G. Shankar |
| 14 | K. Maheswari | Student II MPC EM | M. Maheswari |