P.R. GOVERNMENT COLLEGE, KAKINADA

AN AUTONOMOUS COLLEGE WITH NAAC "A" GRADE

DEPARTMENT OF PHYSICS

Board of Studies

Physics

2021 - 22

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

Department of Physics

Agenda

Discuss and Approve

1. Syllabus for the Semesters
2. Model question papers and Blue Print
3. Panel of Question paper setters and Examiners.
4. Methodologies of Teaching Learning
5. Internal Assessment Component
6. Minimum mark in Internal Assessment
7. Introducing of new courses of study and possibilities.
8. Admission criteria for programs offered by the department
9. Proposal community service / extension activities / projects for the benefit of the society.
10. 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

November - 2021

1. It is resolved to continue to offer two Electives in Semester VI for the present academic year 2021 – 22 as done in the previous year ie., 2020-21. The student has to choose one of the two electives.
   VII B Material Science
   VII C Renewable Energy

2. It is resolved to offer two Cluster Electives in semester VI comprising of three papers each. 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: Application of Nano materials and Devices.

   Cluster Elective C
   VIII C1: Solar Thermal and Photovoltaic Aspects
   VIII C2: Wind, Hydro and Ocean Energies
   VIII C3: Energy Storage Devices

3. It is resolved to approve the Question Bank and Blue print for all the semesters of I, II & III years

4. It is resolved to approve the conduct of semester end practical exams for all I, II & III years uniformly from the academic year 2021 - 22

5. It is resolved to approve the scheme of evaluation for Practical examinations for all the semesters of I,II&III years.

6. It is resolved to approve to conduct Two mid semester examinations for Internal assessment for I year Students from academic year 2021 – 22. Out of the two one would be an online examination for 25 Marks and another would be theoretical for 25 Marks. An average of both the examinations would be taken for internal assessment.

7. It is resolved to approve question bank of MCQ's intended for I mid examination for I year students.

8. It is resolved to approve to continue to conduct two theoretical mid semester examination for II & III year students.

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

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

For I year CCE – 25 Marks
- 10 M – Study Project (Theoretical for odd sem / Practical for even sem)
- 10 M – Viva-voce on subject
- 05 M – Assignment / Quiz / Group discussion

For II & III year CCE – 20 Marks
- 10 M – Mini Project
- 5 M - Seminar/ Assignment
- 5 M – Quiz /Group discussion

11. To alter the number of seats for I year MPC Telugu medium and English medium.
ie., To increase the number of seats in MPC English medium from 30 to 45 and to decrease the number of seats in MPC Telugu medium from 60 to 45 and converted in to English medium. This is done by considering the demand ratio of both the groups for the past three years.

12. It is resolved to approve Department Action Plan for the academic year 2021-22.

13. Resolved to approve funds allocated under various heads

Sl. No	Purpose	Projected Amount
1	Board of Studies	5,000/-
2	Invited Lectures	12,000/-
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	20,000/-
8.	Study Area Programme	50,000/-
9	Teacher Training Programme	1,00,000/-
Total		**4,97,000/-**

P.R. Government College (A), Kakinada

Department of Physics

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.

The programme also aims

- 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 oftheir 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 (2nd 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 (4th 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 (6th 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.

P.R. Government College (A), Kakinada

Department of Physics

Abstract of Course Wise Allocation of Credits

S. No.	Semester	PAPER	Course Code	Course	Hours/Week	Hours/Sem	Max. Marks	No. of Credits	Course Credits
1	I	PAPER – 1	PH1202	Mechanics &Waves and Oscillations	04	60	50 + 50	4	4
2	I	Practical – 1	PH1202 P	Mechanics &Waves and Oscillations	03	30	50	1	1
3	II	PAPER – 2	PH2202	Optics	04	60	50 + 50	4	4
4	II	Practical – 2	PH2202 P	Optics	03	30	50	1	1
5	III	PAPER – 3	PH3202	Thermodynamics	04	60	60 + 40	4	4
6	III	Practical – 3	PH3202 p	Thermodynamics	03	30	50	1	1
7	IV	PAPER – 4	PH4202	Electricity, Magnetism &Electronics	04	60	60 + 40	4	4
8	IV	Practical – 4	PH4202 P	Electricity, Magnetism &Electronics	03	30	50	1	1
9	V	PAPER - 5	PH5203	Electrostatic & Magnetostatics Basic and Digital Electronics	03	45	60 + 40	3	3
10	V	Practical - 5	PH5203 P	Electrostatic &Magnetostatics Basic and Digital Electronics	03	30	50	2	2

11	V	PAPER - 6	PH5204	Modern Physics	03	45	60 + 40	3	3
12	V	Practical - 6	PH5204 P	Modern Physics	03	30	50	2	2
13	VI	PAPER VII - B	Elective	Materials Science	03	45	60 + 40	3	3
14	VI	**PAPER VII - C**		**Renewable energy**	03	45	60 + 40	3	3
15	VI	Practical VII (B/C)	Elective	Elective practical	03	30	50	2	2
16	VI	PAPER VIII(B)-1	Cluster Elective - B	Fundamentals of Nanoscience	03	45	60 + 40	3	3
17	VI	Practical VIII (B) -1		Cluster Elective practical – (B) - 1	03	30	50	2	2
18	VI	PAPER VIII(B)-2		Synthesis and Characterization of nanomaterials	03	45	60 + 40	3	3
19	VI	Practical VIII (B) -2		Cluster Elective practical – (B) - 2	03	30	50	2	2
20	VI	PAPER VIII(B)-3		Applications of Nano materials and devices	03	45	60 + 40	3	3
21	VI	Practical VIII (B) -3		Cluster Elective practical – (B) – 3 / Project	03	30	50	2	2

22	VI	PAPER VIII(C)-1	Cluster Elective - C	Solar Thermal and Photovoltaic Aspects	03	45	60 + 40	3	3
23	VI	Practical VIII(C)-1		Cluster Elective practical – C-1	03	30	50	2	2
24	VI	PAPER VIII(C)-2		Wind, Hydro and Ocean Energies	03	45	60 + 40	3	3
25	VI	Practical VIII (C) -2		Cluster Elective practical – C -2	03	30	50	2	2
26	VI	Paper VIII (C) -3		Energy Storage Devices	03	45	60 + 40	3	3
27	VI	Practical VIII (C) -3		Cluster Elective practical – C -3 / Project	03	30	50	2	2
Total Credits Awarded - 50									

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P.R. Government College (A), Kakinada

Blue print for Semester End Theory Examination

For IYear (Sem I &sem II)Papers

S. No.	Type of question	No. of Questions Given			No. of Questionsto 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				**95**			**50**

Percentage of Choice given= $\frac{95-50}{95}\ x\ 100$

$= \frac{45}{95}\ x\ 100 \qquad = 47.4\ \%$

P.R. Government College (A), Kakinada

Blue Print for Internal Theory Examination

For I Year (Sem I &Sem II) Papers

S. No.	Type of question	No. of Questions Given			No. of Questionsto 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	1	10	10
2	**Section – B** Short answer questions	5	5	25	3	5	15
TOTAL				**45**			**25**

Percentage of Choice given $= \frac{45-25}{45} X\ 100 = 44.44\ \%$

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

Study project = 10 marks

(Theoretical for odd sem / Practical for even sem)

Viva on subject = 10 marks

Seminar/ GD/ Assignment = 5 marks

Total **= 25 marks**

P.R. Government College (A), Kakinada

Blue print for Semester End Theory Examination

For II year (Sem III &sem IV) &
III year (Sem V &semVI) Papers

S. No.	Type of question	No. of Questions Given			No. of Questionsto 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	12	5	60	6	5	30
TOTAL				**120**			**60**

Percentage of Choice given= $\frac{120-60}{120}\ x\ 100$

$= \frac{60}{120}\ x\ 100 \qquad = 50\ \%$

P.R. Government College (A), Kakinada

Blue Print for Internal Theory Examination

For II year (Sem III &sem IV) &
III year (Sem V &sem VI) Papers

S. No.	Type of question	No. of Questions Given			No. of Questionsto 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**

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 allocated for CCE are further divided as follows

Seminar / Assignment	= 5 marks
Group discussion / Quiz	= 5 marks
Mini Project	= 10 marks
Total	**= 20 marks**

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

Practical Paper

Scheme of Valuation for Practicals

Time: 2hrs 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 Voce - 10 Marks
6. Records - 10 Marks

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

P.R. GOVERNMENT COLLEGE (A), KAKINADA

DEPARTMENT OF PHYSICS

ADDITIONS AND DELETIONS IN THE III YEAR

Semester - I			
S. No.	Name of the Unit	**Topics added**	**Justification**
1	**Unit IV**	**Complex vibrations (6)** Fourier theorem and evaluation of the Fourier coefficients(T), analysis of periodic wave functions-square wave(T), saw-tooth wave(P).	1. In continuation with the previous topic 2. It is appropriate to include this topic in view of further studies and competitive exams
		Topics deleted	**Justification**
2	**Unit-II:** **Unit IV** **Unit-V:**	weightlessness ,Physiological effects of astronauts **Coupled oscillations:** Coupled oscillators - introduction , Two coupled oscillators, Normal coordinates and Normal Modes. Melde's strings.	Not related to the topic 1. Hard to understand the concept for the students 2. Not much application oriented Not necessary to study the topic here
Semester - II			
	Name of the Unit	**Topics Deleted**	**Justification**
3	**Unit-II:** **Unit -III:**	Explanation of rectilinear propagation of light, Basic principle of LCDs	Not necessary to study the topic here Not much relevant to the existing syllabus
Semester - III			
	Name of the Unit	Topics added	Justification
4	**Unit - III** **Unit V** **Unit VI**	Stephen – Boltzmann law - derivation Black body & its radiation, Fery's Black body Measurement of radiation – Types of pyrometers(S) – Disappearing filament optical pyrometer.	It is appropriate to include this topic in view of further studies and competitive exams For the continuation of the syllabus

		Semester - III	
	Name of the Unit	Topics Deleted	Justification
5	**Unit - I** **Unit - II** **Unit - III** **Unit - IV** **Unit - V**	Principle of equi partition of energy (Qualitative ideas only), Thermodynamic scale of temperature and its identity with perfect gas scale ,Principle of refrigeration Joule-Kelvin coefficient for ideal gases Liquefaction of air by Linde's method spectral energy distribution of black body radiation	All these topics are covered in lower classes hence added as additional inputs
		Semester - IV	
	Name of the Unit	Topics Added	Justification
6	**Unit - I** **Unit - III**	Potential due to i) a point charge, ii) ***Dipole*** B due to a long straight wire	These topics are very essential for the continuation of the previous topics
		Semester - IV	
	Name of the Unit	Topics Deleted	Justification
7	**Unit - I** **Unit - II** **Unit - III** **Unit - IV** **Unit - V**	an infinite conducting sheet of charge, Potential due to a uniformly charged sphere Dielectric strength Ampere's Circuital Law and its application to Solenoid, Eddy currents Parallel resonant circuit Light Emitting Diode (LED)	All the topics are less in weightage and to cover huge syllabus these topics are added as Additional inputs

NOTE: **ALL THE DELETED TOPICS ARE ADDED AS ADDITIONAL INPUTS**

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

I B.Sc., Physics-Semester-IPaper – I

W.e.f. 2021 - 22ADMITTED BATCH

MECHANICS, WAVES AND OSCILLATIONS

CourseCode: PH1202 No. of credits: 03 4 Hours/Week Total hours: 50hrs

UNIT-I:

1. Mechanics of Particles (5 hrs)

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

2. Mechanics of Rigid bodies (7 hrs)

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

Unit-II:

3. Motion in a Central Force Field (12hrs)

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

UNIT-III:

4. Relativistic Mechanics (12hrs)

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

Unit-IV:

5. Undamped, Damped and Forced oscillations: (07 hrs)

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

6. Complex vibrations (6)

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

Unit-V:

7. Vibrating Strings: (07 hrs)

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

8. Ultrasonics: (05 hrs)

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

REFERENCE BOOKS:

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

Changes Recomonded for SEM I

Deletions :

Physiological effects of astronauts

Melde's strings.

Coupled oscillations: (05 hrs)

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

Aditions

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).

I B.Sc.,Semester – I(Modelpaper)
PHYSICS - Paper 1
(MECHANICS& WAVES AND OSCILLATIONS)

Course Code:PH1202 **No. of credits: 03**

W.e.f. 2021 - 22ADMITTED 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: 50

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

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Problems 5 marks	Marks allotted
I	1	1	0	15
II	2	1	0	25
III	1	1	1	20
IV	1	1	1	20
V	1	1	0	15
Total Marks				95

Note: At least ONE problem should be answered.

QUESTION BANK

SUBJECT: PHYSICS **PAPER: I** **SEMESTER: I**

MECHANICS

UNIT-I (MECHANICS OF PARTICLES&MECHANICS OF RIGID BODIES)

Essay Questions-10M

1. Derive an expression for Rutherford's scattering angle.
2. State Newton's laws. Derive the equation of motion of variable mass system?
3. Explain the motion of a rocket under constant gravitational field.
4. What is rigid body? Derive Euler's equations for a rigid body?
5. Define rigid body. Obtain rotational kinematic relations of rigid body.
6. Explain the precession of symmetric top. Obtain an expression for its precessional frequency.

Short Questions – 5 M

7. Explain the multistage Rocket?
8. Write a note on impact parameter?
9. Obtain the equation of motion for a rotating body.
10. Explain the principle and working of a Gyroscope.
11. Write a short note on inertia tensor.
12. Write a note on precession of Equinoxes.

UNIT-II(MOTION IN CENTRALFORCE FIELD)

Essay questions-10M

14. What are central forces?"Show that the central force is conservative"
15. State and prove Kepler's first law of planetary motion?
16. State and prove Kepler's second and third laws of planetary motion?

Short Questions – 5M

17. Derive equation of motion under central force?
18. What are satellites? Discuss the motion of satellite and derive expression for velocity.
19. Write a note on geo stationary satellite.

UNIT – III(RELATIVISTIC MECHANICS)

Essay Questions-10M

19. Describe Michelson-Morley experiment and explain the physical significance of negative results
20. State the Postulates of Special theory of Relativity. Derive Einstein's Mass Energy equivalence relation.
21. What is relativity? Derive Lorentz transformation equations?
22. Derive an expression forthe variation of mass of a body with velocity.

Short Questions – 5M

23.Write about Galilean relativity.
24.Explain Length Contraction.
25.Explain time dilation.

Problems-5M

26.Calculate the velocity of the rod, when its length will appear 90% of its proper length.
27.A particle of mass M_0 is moving with a velocity 0.9C. Calculate its relativistic mass.
28.Find the mass of Electron moving with a velocity 10^{10} cm/sec. The rest mass of the electron is $9.1x10^{-31}$Kg.
29.The total energy of a particle is exactly twice its rest energy. Find its speed.

UNIT – IV (UNDAMPED,DAMPEDAND FORCED OSCILLATIONS& COMPLEX OSCILLATIONS)

Essay Questions - 10M

30.Obtainthe differential equation for the motion of a simple harmonic oscillator.Findits solution?
31.ExplainDamped oscillations. Obtainequation for damped oscillator and find its solution?
32.What are Forced oscillations? Obtaindifferential equation for forced oscillations and find its solution.
33. State and prove Fourier theorem?
34. Analyse a square wave using fourier theorem?
35. Analyse a saw-tooth wave using Fourier theorem?

Short Questions – 5 M

36.Explain Logarithmic decrement of an oscillator?
37.Define Relaxation time? Derive the formula for it?
38.Explain Quality factor?
39. What are limitations of Fourier theorem?
40. Evalute the values of $\mathbf{A_O, A_r, B_r}$?

Problems - 5M

41.A damped oscillator starting from rest reaches a first amplitude of 500mm. It reduces to 50mm after 100 oscillations. The periodic time is 2.3sec. Find the damping constant and relaxation time.
42.The amplitude of a second pendulum falls to half initial value in 150 sec. calculate the Q factor.
43.The amplitude of an oscillator of frequency 200Hz falls to 1/10 of its initial value after 2000 cycles. Calculate its relaxation time.

UNIT- V(Vibrating strings&Ultrasonics)

Essay Questions - 10M

44.Obtain the equation for velocity of transverse wave in a stretched string and discuss the solution of a wave equation.

45. Explain modes of vibration of stretched string clamped at both ends.
46.What are Ultrasonic waves? Describe the magnetostriction method of producing ultrasonics?
47.Explain how ultrasonic waves can be produced and detected using Piezo-electric method?

Short Questions – 5 M

48.What are the applications of ultrasonic waves?
49.Explain various methods used in detection of ultrasonics?
50.Write the properties of ultrasonics.

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I B.Sc., Skill Development Course-Semester-1

W.E. F. 2020-21 ADMITTED BATCH

Electrical Appliances

Course Code: SDCEA01 No. of credits: 2 Hours Week: 2 Total hours: 30hrs

UNIT-L (10 hrs):

Voltage, Current Resistance, Capacitance. Inductance. Electrical conductors and Insulators. Ohm's law. Series and parallel combinations of resistors. Galvanometer. Ammeter. Voltmeter. Multimeter. Transformers, Electrical energy. Power. Kilowatt hour (kWh). Consumption of electrical power

UNIT-II (10 hrs):

Direct current and alternating current. RMS and peak values. Power factor. Single phase and three phase connections. Basies of House wiring. Star and delta connection Electric shock. First aid for electric shock. Overloading. Earthing and its necessity. Short circuiting. Fuses. MCB, ELCB. Insulation. Inverter. UPS.

UNIT-III (10 hrs) :

Principles of working, parts and servicing of Electric fan. Electric Iron box, Water heater: Induction heater, Microwave oven: Refrigerator. Concept of illumination, Electric bulbs. CTL. LED lights, Energy efficiency in electrical appliances. IS codes & IE codes.

REFERENCE BOOKS:

1. A text book on Electrical Technology. B.L.Theraja. S.Chand& Co..
2. 2. A text book on Electrical Technology. A.K. Theraja.
3. Performance and design of AC machines, M.G.Say, ELBS Edn.,
4. Handbook of Repair & Maintenance of domestic electronic appliances: BPB publications
5. 5. Consumer Electronics. S.P.Bali. Pearson
6. Domestic appliances servicing. K.P. Anwer. Scholar institute publications

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

I B.Sc., Skill Development Course-Semester-1

W.E. F. 2020-21 ADMITTED BATCH

Electrical Appliances

Course Code: SDCEA01 No. of credits: 2 Hours Week: 2 Total hours: 30hrs

Note: Set the Question paper as per the blue print given at the end of this model paper

Time : 2 Hrs. Max. marks: 50

Section	Questions to be given	Questions to be answered	Marks
A	6	3	3x10M=30M
B	8	4	4X5M =20M
Total	14	7	50M

Blue Print

Module	Essay Questions 10 Marks	Short Questions 5 Marks	Marks allotted
Unit – I	2	2	30
Unit – II	2	3	35
Unit – III	2	3	35
Total Marks			100

QUESTION BANK

SUBJECT: Electrical Appliances **SEMESTER : 1**

Essay Questions

UNIT - I

1. Give the principle of transformer and explain its working.
2. List out the differences between Galvanometer and Ammeter
3. What are electrical conductors and insulators? Give 2 examples for each

UNIT-2

4. Write a note on MCB.
5. Write about single phase and three phase power supplies? Explain
6. What do you mean by star and delta connections? Elaborate.

UNIT - 3

7. Identify various parts of an electric fan explain its working.
8. Explain the working of an electric iron box.
9. Explain various parts of an electric water heater.

Short Questions

UNIT - 1

10. Define voltage and current. Mention its units
11. What do you meant by capacitor? Write the expression for capacitors in series and parallel.
12. Write a note on Multi meter.

UNIT - 2

13. Differentiate AC and DC.
14. What is meant by electric shock? Explain first aid for electric shock.
15. Explain the concept of Earthing and write its necessity.
16. Explain how inverter works
17. Write a short note on UPS.

UNIT - 3

18. Write a note on induction heater.
19. Write the function of microwave oven
20. Identify different parts of Refrigerator.
21. Write the construction of LED
22. Explain the working of CFL bulb

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

W.E.F . 2021- 22 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

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

OPTICS

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

w.e.f. 2021-22 ADMITTED BATCH

Hours/Week 4

UNIT-I: Interference of light (12hrs)

Introduction, Conditions for interference of light, Interference of light by division of wave front and amplitude, Phase change on reflection Stokes' treatment, Lloyd's single mirror, Interference in thin films: Plane parallel and wedge shaped films, colours in thin films, Newton's rings in reflected light-Theory and experiment, Determination of wavelength of monochromatic light, Michelson interferometer and determination of wavelength.

UNIT-II: Diffraction of light (12hrs)

Introduction, Types of diffraction: Fresnel and Fraunhoffer diffractions, Distinction between Fresnel and Fraunhoffer diffraction, Fraunhoffer diffraction at a single slit, Plane diffraction grating, Determination of wavelength of light using diffraction grating in Oblique incidence, Resolving power of grating, Fresnel's half period zones, Explanation of rectilinear propagation of light, Zone plate, comparison of zone plate with convex lens.

UNIT-III: Polarisation of light (12hrs)

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

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

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

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

UNIT-V: Lasers and Holography (12hrs)

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

Holography: Basic principle of holography, Applications of holography

Deletions: **UNIT-II: Diffraction of light :**Explanation of rectilinear propagation of light,**UNIT-III: Polarisation of light:** Basic principle of LCDs
UNIT-IV: Aberrations and Fibre Optics: Curvature of field, Distortion

REFERENCE BOOKS:

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

I B.Sc. – II SEMESTER END EXAMINATION
PHYSICS – PAPER II (Model Paper) Semester II
w.e.f. 2021 – 22 ADMITTED BATCH

OPTICS

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: 21/2 Hrs. Max. Marks: 50

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

Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Problems 5 marks	Marks allotted
I	1	1	1	20
II	1	1	0	15
III	1	1	1	20
IV	2	1	0	25
V	1	1	0	15
Total Marks				95

Note: At least ONE problem should be answered.

UNIT: 1 - INTERFERENCE OF LIGHT

Essay questions-10 M

1. Give the theory of interference fringes of light and derive expression of fringe width
2. Describe the Newton's ring method for measuring the wave length of monochromatic light. Give the necessary theory.
3. Describe the construction and working of Michelson interferometer?

Short questions – 5 M

4. Write conditions for interference of light?
5. Discuss the Phase change due to reflection of light from the surface of denser medium
6. Write a short note about Lloyds Mirror.
7. Explain the formation of colours in thin films.

Problems - 5 M

8. In Newton's rings experiment, the diameter of 10^{th} dark ring is 0.433 cm. Find the wave length of incident light, if the radius of curvature of the lens is 70 cm
9. Two coherent sources whose intensity ratio is 81: 1 produce interference fringes. Deduce the ratio of maximum intensity to minimum intensity.
10. In a Newton's ring experiment, the diameter of the 5^{th} ring was 0.3 cm and the diameter of 25^{th} ring was 0.8 cm. If the radius of curvature of Plano-convex lens is 100 cm. Find the wave length of light used.

UNIT: 2- DIFFRACTION OF LIGHT

Essay questions - 10 M

11. Discuss Fraunhofer diffraction due to a single slit. Explain the distribution of intensity of light in the diffraction pattern.
12. Derive the expression for the wavelength of the Monochromatic light using the diffraction grating in Oblique incidence.
13. Explain the construction and working of zone plate? Derive the formula for its focal length.

Short questions - 5 M

14. Find the expression for resolving power of a grating when the light falls normally on the grating
15. Distinguish between Fresnel's and Fraunhofer diffractions.
16. Compare the Zone plate with Convex lens
17. Write a short note on Fresnel's half period zones.

UNIT: 3–POLARISATION OF LIGHT

Essay questions - 10 M

18. Describe the construction and working of Nicols prism. And mention it uses.
19. Explain how circularly and elliptically polarized lights are produced and detected
20. Describe the construction and working of Laurent's half shade Polarimeter.

Short questions - 5 M

21. State and prove Brewster's law.
22. State and explain Malus law.
23. Write a note on Quarter wave plate.
24. Write a note on Half wave plate.
25. Write any method to produce plane Polarized light.

Problems - 5 M

26. Calculate the specific rotation if the plane of polarisation is turned through 26.4^0 traversing 20 cm length of 20% sugar solution?
27. A glass slab is to be used as a polarizer. Find the angle of polarisation for it. Also find the angle of refraction. Given μ for glass = 1.54
28. Calculate the thickness of (a)a quarter wave plate (b) half wave plate given $\mu_e=1.533, \mu_0=1.544$ and $\lambda=5000A^o$

UNIT: 4 – ABERRATIONS AND FIBRE OPTICS

Essay questions-10 M

1. What is Spherical aberration? Discuss the various methods to minimize it.
2. What is Chromatic aberration? Derive the condition for achromatism when two lenses are separated by a distance
3. What is Chromatic aberration? Derive the condition for achromatism when two lenses are in contact.
4. Explain the step index optical fibre and graded index optical fibre.

Short questions – 5 M

5. Explain Astigmatism and its removal methods
6. Explain different modes in Optical fibre
7. Explain the principles of fibre optic communication
8. Give the advantages of fiber optic communication.

UNIT: 5 – LASERS AND HOLOGRAPHY

Essay questions - 10 M

29. What do you mean by LASER? Describe the construction and working of Ruby LASER
30. What do you mean by LASER. Describe the construction and working of He-Ne laser?

Short questions - 5 M

31. Write a short note on Einstein Coefficients.
32. Distinguish between Spontaneous and Stimulated emissions
33. Give any 3 applications of LASER
34. Discuss the applications of Holography.

P.R.GOVERNMENT COLLEGE (A), KAKINADA

I B.Sc., Physics-Practical II Semester - II
w.e.f. 2021-22 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

Heat and Thermodynamics

Course Code: PH2203 **No. of credits: 03**

w.e.f. 2020-21 ADMITTED BATCH

Hours/Week 4

-

UNIT I: Kinetic Theory of gases: (12 hrs)

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

UNIT II: Thermodynamics: (12hrs)

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

UNIT III: Thermodynamic Potentials and Maxwell's equations: (12hrs)

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

UNIT IV: Low temperature Physics:(12hrs) Methods for producing very low temperatures, Joule Kelvin effect, Porous plug experiment , Joule expansion, Distinction between adiabatic and Joule Thomson expansion, Expression for Joule Thomson cooling, Liquefaction of air by Linde's method, Production of low temperatures by adiabatic demagnetization (qualitative), Practical applications of substances at low temperatures.

UNIT V: Quantum theory of radiation (I): (07 hrs) Black body & its radiation, Fery's Black body and its spectral energy distribution of black body radiation,Kirchoff's law, Wein's displacement law, Stefan-Boltzmann's law and Rayleigh-Jean's law (Noderivations), Planck's law of black body radiation-Derivation, Deduction of Wein's law and Rayleigh- Jean's law from Planck's law,

UNIT VI: Quantum theory of radiation (II): (05 hrs) Measurement of radiation – Types of pyrometers(S) – Disappearing filament optical pyrometer experiment,Solar constant and its determination using Angstrom pyroheliometer, Estimation of surface temperature of Sun.

Changes recommended for SEM III

Deletions

UNIT I: Kinetic Theory of gases:

Principle of equipartition of energy (Qualitative ideas only),

UNIT II: Thermodynamics:

Thermodynamic scale of temperature and its identity with perfect gas scale, Principle of refrigeration

UNIT III: Thermodynamic Potentials and Maxwell's equations:

Joule-Kelvin coefficient for ideal gases.

UNIT IV: Low temperature Physics:

Liquefaction of air by Linde's method,

UNIT V: Quantum theory of radiation:

spectral energy distribution of black body radiation

Additions:

UNIT III: Thermodynamic Potentials and Maxwell's equations:

Stephen – Boltzmann law - derivation

UNIT V: Quantum theory of radiation:

Black body & its radiation, Fery's Black body

UNIT VI: Quantum theory of radiation (II):

Measurement of radiation – Types of pyrometers(S) – Disappearing filament optical pyrometer experiment

P.R.GOVERNMENT COLLEGE (A), KAKINADA

II B.Sc., SEMESTER–III PAPER III(Model Paper)

w.e.f. 2020 - 21 ADMITTED BATCH

THERMODYNAMICS

Course Code : PHY203 **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	6	3	3 x 10M = 30M
B	12	6	6x5M= 30M
Total	18	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	2	25
III	1	2	-	20
IV	1	2	1	25
V	1	1	-	15
VI	1	1	1	20
Total Marks				120

Note: At least ONE problem should be answered.

QUESTION BANK

SUBJECT: PHYSICS PAPER: III SEMESTER: III

THERMODYNAMICS

Module – I (KINETIC THEORY OF GASES)

Essay questions - 10 M

1. Derive an expression for the Maxwell's law of distribution of molecular speeds in a gas.
2. Define Coefficient of Viscosity. On the basis of kinetic theory of gases, derive an expression for the coefficient of Viscosity.
3. Define Coefficient of Thermal Conductivity. On the basis of kinetic theory of gases, derive an expression for the coefficient of Thermal Conductivity.

Short questions - 5 M

4. Explain the Transport Phenomena with reference to a gas.
5. Write a short note on Mean free path.
6. Write a short note on Coefficient of Diffusion of gases.

Module – II (THERMODYNAMICS)

Essay questions - 10 M

7. Describe the working of Carnot's Engine and derive an expression for its Efficiency.
8. Define Entropy. Give the Physical significance of the entropy. Calculate the change in Entropy in irreversible cycle.
9. What is a T-S diagram? Give its uses. Obtain an expression for the efficiency of a Carnot's engine using T-S diagram.

Short questions - 5 M

10. What are reversible and irreversible processes? Give examples
11. State and Prove Carnot's theorem.
12. Obtain an expression for the change in entropy in Reversible cycle.
13. Write a short note on Entropy and disorder.

Problems - 5 M

14. Calculate the efficiency of a reversible engine working between 327^0C and 127^0C
15. Carnot engine has the same efficiency between 1500K and 500K and T K and 1000K. Find the value of T.
16. The efficiency of a carnot engine is 40%. If heat absorbed at 727^0C, then what is the low temperature in ^{0}C.
17. An engine absorbs 2000 Joule of heat at a high temperature and exhausted 1200 Joule of heat at a low temperature. What is the efficiency of the engine.
18. Calculate the change of entropy when 300g of lead melts at 327^0C. Lead has a latent heat of fusion of 5.85 Cal g^{-1}

Module – III (THERMODYNAMIC POTENTIALS & MAXWELLS EQUATIONS)

Essay questions - 10 M

19. What are Thermodynamic Potentials? Derive the Maxwell's Thermodynamic Equations.
20. Derive Stephen – Boltzmann law using Maxwell's Equations

Short questions - 5 M

21. Derive the Equation for the difference of two specific heats of a perfect gas
22. Derive the Equation for the ratio of two specific heats
23. Derive Clausius – Clapeyron's equation from Maxwell's Equations.
24. Write about Thermodynamic Potentials.

Module – IV (LOW TEMPERATURE PHYSICS)

Essay questions - 10 M

25. What is Joule – Thomson Effect? Obtain an expression for the Cooling produced in this effect.
26. What is Adiabatic demagnetization? Explain the Principle of Adiabatic demagnetization.

Short questions - 5 M

27. Describe the porous plug experiment and indicate the results
28. Distinguish between adiabatic and Joule Thomson expansionPractical applications of substances at low temperatures.

Problems - 5 M

29. Calculate the temperature of inversion of helium gas. Given that a = 3.44x13-3 nt-m^4/mol^2 and b = 0.0237x10^{-3} m^3/mol and R = 8.31 joule/(mol – K)
30. Calculate the temperature of inversion in case of H_2 and CO_2 from the given date. T_c for H_2 is -239.9°C and fro Co_2 is 31°C.
31.

Module – V (QUANTUM THEORY OF RADIATION 1)

Essay questions - 10 M

32. State Planck's hypothesis. Derive Planck's formula for the distribution of energy in black body radiation.
33. Derive Wein's law and Rayleigh-Jeans law from Planck's radiation law.

Short questions - 5 M

34. Describe Fery's black body
35. What is black body? What are the properties of black body radiation?

Module – VI (QUANTUM THEORY OF RADIATION 2)

Essay questions - 10 M

36. Write a note on Disappearing filament Optical pyrometer.
37. How do you determine Solar constant experimentally by using Angstrom Pyroheliometer?

Short questions - 5 M

38. Write a short note on Solar constant.
39. How temperature of sun is determined?

Problems - 5 M

40. Determine the temperature of sun with the help of wien's law, given b = 2.92 X 10^{-3}mK. Maximum wavelength = 4900 A^0.
41. A black body radiator at 0^0 c radiates energy of 3.2 X10^2 Jm^{-2} sec^{-1}. Calculate the value of Stefan's constant.
42. Calculate the temperature of the sun from the following data. S = 1.34 KW/ m^2, radius of the Sun = 7.92 X 10^5 Km. Distance of the sun from the earth = 1.5 x10^5 Km and Stefan's constant = 5.7 X 10^{-8} W m^{-2} K^{-4}.

P.R.GOVERNMENT COLLEGE (A), KAKINADA

Heat and Thermodynamics Lab

II B.Sc., Physics-Practical IIISemester - III

w.e.f. 2021-22 ADMITTED BATCH

Course Code : PH1202P(B) **No. of credits : 02**

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

Details of Lab/Practical/Experiments/Tutorials syllabus:

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.

11. Calculation of temperature coefficient of given material using Carry Fosters bridge.

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

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

Electricity, Magnetism & Electronics

Course Code: PH2203 **No. of credits: 03**

w.e.f. 2020-21 ADMITTED BATCH

Hours/Week 4

UNIT I:

Electrostatics: (6hrs) : Gauss's law-Statement and its proof, Electric field intensity due to (i) uniformly charged solid sphere and (ii) an infinite conducting sheet of charge, Deduction of Coulomb's law from Gauss law, Electrical potential–Equipotential surfaces, Potential due to a uniformly charged sphere. Potential due to i) a point charge, ii) ***Dipole***

UNIT II

Dielectrics: (6 hrs): Dielectrics-Polar and Non-polar dielectrics- Effect of electric field on dielectrics, Dielectric strength, Capacitance of a parallel plate condenser with dielectric slab between the plates, Electric displacement D, electric polarization P,Relation between D, E and P, Dielectric constant and electric susceptibility.

UNIT III:

Magnetostatics: (10 hrs): Biot-Savart's law and its applications: (i) circular loop (ii)solenoid and (iii) long straight wire, Ampere's Circuital Law and its application to Solenoid, Hall effect, determination of Hall coefficient and applications.

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

UNIT IV:

Alternating currents: (09hrs): Alternating current - Relation between current and voltage in L,C, R, LR and CR circuits, Phasor and Vector diagrams, LCR series and parallel resonant circuit, Q –factor, Power factor.

Electromagnetic waves-Maxwell's equations: Idea of displacement current, Maxwell's equations-Derivation, Maxwell's wave equation (with derivation), Transverse nature of electromagnetic waves, Poynting theorem (Statement and proof). Velocity of wave equation using maxwells relations in vacuum.

UNIT V:

Basic Electronic devices: (08): PN junction diode, Zener diode and Light Emitting Diode (LED) and their I-V characteristics, Zener diode as a regulator- Transistors and its operation, CB, CE and CC configurations, Input and output characteristics of a transistor in CE mode, Relation between α,β and Υ; Transistor as an amplifier.

UNIT-VI:

Digital Electronics: (06 hrs): Number systems, Conversion of binary to decimal system and vice versa, Binary addition & Binary subtraction (1's and 2's complement methods), Laws of Boolean algebra, DeMorgan's laws-Statements and Proofs, Basic logic gates, NAND and NOR as universal gates, Exclusive-OR gate, Half adder and Full adder circuits.

P.R.GOVERNMENT COLLEGE (A), KAKINADA

III B.Sc Physics Paper – IV – Semester – IV – Model Paper
w.e.f. 2020 - 21 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: 2 1/2Hrs. Max. Marks: 60

Section	Questions to be given	Questions to be answered	Marks
A	6	3	3 x 10M = 30M
B	12	6	6x5M= 30M
Total	18	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	--	15
III	1	1	2	25
IV	1	2	1	25
V	1	1	1	20
VI	1	1	1	20
Total Marks				120

Note: At least two problems should be answered.

QUESTION BANK

SUBJECT: PHYSICS PAPER: IV SEMESTER: IV

UNIT-I (Electrostatics)

Essay questions-10M

1. State and Prove Gauss theorem in electrostatics
2. State Gauss theorem and derive an expression for the electric field due to uniformly charged sphere?
3. Define Electric dipole. Derive an expression for Electric potential due to a dipole.

Short questions- 5M

4. Derive an expression for electric potential due to a point charge
5. What are equipotential surfaces?
6. Deduce Coulomb's law from Gauss law

UNIT-II (Dielectrics)

Essay questions-10M

7. Define D, E and P and deduce relation between them.
8. Derive the Capacitance of a parallel plate condenser with dielectric slab between the plates

Short questions- 5M

9. Explain the effect of electric field on dielectrics.
10. Find the relation between Susceptibility and Dielectric Constant.

UNIT-III (Magneto statics &Electromagnetic Induction)

Essay questions-10M

11. Derive an expression for the magnetic induction at a point due to an infinitely long straight current carrying current.
12. Derive an expression for the magnetic induction on the axis due to circular loop.
13. Define Hall Effect? Derive an expression for hall coefficient? Mention its applications.
14. Define Coefficient of Self-induction and obtain an expression for self-inductance of a solenoid.

Short questions- 5M

15. State and explain Biot-Savart's law.
16. Obtain an expression for the energy stored in a solenoid.
17. State and explain Faraday's and Lenz's law?
18. Explain self-inductance and mutual inductance.

Problems – 5M

19. A long straight wire carries a current 3.5A. Find the magnetic induction at a point 0.2m from the wire.
20. A current of 1A is flowing in a circular coil of radius 10 cm and 20 turns. Calculate the magnetic field at a distance 10cm on the axis of the coil and centre.

21. The single carrier holes in a shaped silicon sample are 2.05×10^{22} $m^{-3.}$ Calculate its Hall Coefficient.

UNIT-IV (Alternating currents, Electromagnetic waves-Maxwell's equations)

Essay questions-10M

22. What is series LCR circuit? Derive an expression for the resonant frequency of the circuit.
23. Derive the equation of Electromagnetic wave. Show that the velocity of EM wave is equal to velocity of light in free space.
24. Derive Maxwell's equations in differential form.

Short questions – 5M

25. Write a short note on Poynting Vector.
26. Define Q-factor and power factor
27. Derive the relation between voltage and current in LR circuit
28. Derive the relation between voltage and current in LR circuit

UNIT-V (Basic **Electronic Devices)**

Essay questions-10M

29. Describe the construction & working of a PN junction diode. Explain the V-I characteristics of PN junction diode.
30. Describe the construction & working of a Zener diode. Explain the V-I characteristics of Zener diode.
31. Explain the Input & Output characteristics of PNP transistor in CE configuration.

Short questions- 5M

32. Define α, β&Υ of a transistor. Obtain a relation between them.
33. Explain a Zener diode as a voltage regulator.
34. How does transistor work as an amplifier?

Problems-5M

35. Current Amplification factor of a common base configuration is 0.88. Find the value of base current when the emitter current is 1mA.
36. For a transistor $\beta = 40$ and $I_B = 25\ \mu A$. Find the value of I_E.

UNIT- VI (Digital Electronics)

Essay questions-10M

37. State and prove De-Morgan's theorem?
38. Draw the circuit diagrams of Half adder & full-adder and explain its operation with truth table.

Short questions - 5M

39. Draw the truth table of AND, OR & NOT logic gates?
40. Show that NAND Gate is a universal gate?
41. Show that NOR Gate is a universal gate?

Problems-5M

42. Convert the following (A) 55_{10} = ……$_2$ (b) 10010.1011_2 = ……$_{10}$
43. Using 2's complemental , subtract $(100111)_2$ from $(110011)_2$

Add the following using binary addition method $(10111)_2$ and (10101

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

II B.Sc., Physics-Semester – IV, Paper – IV
Modern Physics

Course Code: PH4203 **No. of credits: 03**

W.e.f. 2020-21 ADMITTED BATCH

Hours/Week 4

UNIT I: Atomic and Molecular Physics :(12 hrs):

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

UNIT II: Matter waves &Uncertainty Principle :(12 hrs):

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

UNIT III: Quantum (Wave) Mechanics :(12 hrs):

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

UNIT IV: Nuclear Physics :(12 hrs):

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

UNIT-V: Nano materials :(7hrs):

Nanomaterials – Introduction, Synthesis of nano particles – ball milling method, sputtering method and Sol-Gel method, Properties of nano particals (mechanical, optical, electrical and magnetic), Properties of nano materials, Quantum well, Quantum wire, Quantum dot, Structure of diamond and graphite, CNT and its types, applications of nano technology.

UNIT-VI: Superconductivity: (5 hrs):

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

REFERENCE BOOKS:

1. BSc Physics, Vol.4, Telugu Academy, Hyderabad

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

P.R.GOVERNMENT COLLEGE (A), KAKINADA

II B.Sc Physics Paper – IV – Semester – IV – Model Paper
W.e.f. 2020 - 21 ADMITTED BATCH

Course Code: PH4203 **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: 2 1/2Hrs. Max. Marks: 60

Section	Questions to be given	Questions to be answered	Marks
A	6	3	3 x 10M = 30M
B	12	6	6x5M= 30M
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Blue Print

Module	Essay Questions 10 marks	Short Questions 5 marks	Problems 5 marks	Marks allotted
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II	1	1	--	15
III	1	1	2	25
IV	1	2	1	25
V	1	1	1	20
VI	1	1	1	20
Total Marks				120

Note: At least two problems should be answered.

QUESTION BANK

SUBJECT: PHYSICS PAPER: V SEMESTER: IV

UNIT-I (Atomic & Molecular Physics)

Essay Questions - 10M

1. Explain the Quantum Numbers associated with Vector Atom model.
2. Describe the Stern and Gerlach experiment and indicate the importance of the results obtained.
3. What is Raman Effect? How it is experimentally studied. Mention any two applications of Raman Effect

Short Questions - 5M

4. Explain L – S Coupling Scheme.
5. Explain j – j Coupling Scheme.
6. Explain different types of spectra
7. Explain the selection rules of L, S and J.
8. Explain Zeeman effect.
9. Explain the formation of Stoke's and Anti Stoke's lines on the basis of quantum theory.

Problems - 5M

10. Prove that for a given principal quantum number n, there are n^2 possible states each of which can accommodate a maximum of 2 electrons.
11. Consider a state with L=1 and S=1/2 .What are the possible spectrum terms.
12. The Exciting line in an experiment is 5460 A and the stokes line is at 5520 A^0.Find the wave length of anti – stokes line.
13. A sample was excited by 4358 A^0 line. A Raman line was observed at 4447 A^0. Calculate the Raman shift.

UNIT II (Matter waves & uncertainty principle)

Essay Questions - 10M

14. Describe the Davisson and Germer experiment to demonstrate the wave character of electrons.
15. What are matter waves? Derive an expression for de-Broglie wavelength of matter waves.
16. State and Explain Heisenberg's uncertainty principle for position and momentum. Extend it to Energy and Time.

Short Questions - 5M

14. Write the properties of matter waves.
15. State and Explain Heisenberg's uncertainty principle.
16. Explain de – Broglie hypothesis of matter waves.

Problems - 5M

17. If the uncertainty in the momentum of an electron is 1.65×10^{-24} kg m/sec. calculate the uncertainty in its position.
18. Calculate the de-Broglie wavelength associated with a proton moving with a velocity equal to $1/20^{th}$ of the velocity of light. Mass of the proton is 1.67×10^{-27}kg)

UNIT – III (Quantum mechanics)

Essay Questions - 10M

19. Derive Schrodinger time dependent wave equation.
20. Derive Schrodinger time independent wave equation.
21. Obtain an expression for the energy of particle in one dimensional potential well of infinite height.

Short Questions - 5M

22. Mention the basic postulates of quantum mechanics.
23. Explain the physical interpretation of wave function.
24. Explain Eigen functions and Eigen values.

Problems - 5M

25. Find the least energy of an electron moving in the dimension in an infinitely high potential box of width $1A^0$. Given mass of the electron $9.11x10^{-31}$ kg and $h=6.63x10^{-34}$ J-s
26. An electron is moving in one dimensional potential box of infinite height of width 25 A^O. Calculate the lowest energy of electron.

UNIT –IV (Nuclear Physics)

Essay Questions - 10M

27. Explain liquid drop model in detail. Write its drawbacks.
28. Explain shell model of nucleus. Mention its merits and demerits.
29. Explain the construction and working of G.M. Counter

Short Questions - 5M

30. Explain any four basic properties of nuclei.
31. Write a note on mass defect.
32. What is binding energy? Explain it.
33. Explain Yukawa's meson theory of Nuclear forces.
34. Explain the working of Wilson cloud chamber.

UNIT –V (Nano Materials)

Essay Questions - 10M

35. Illustrate any two methods of synthesis of nano particles.
36. Write any three properties of nano particles.
37. Explain the structure of diamond and graphite.

Short Questions - 5M

38. What are carbon nano tubes? Explain its types.
39. Explain the concept of Quantum well, Quantum wire, Quantum dot.
40. Mention any 5 properties of nano materials.
41. Give any 5 applications of nano technology.

UNIT –VI (Radio active decay)

Essay Questions - 10M

42. Explain Type-I and Type-II superconductors?
43. State and explain Meissner Effect.

Short Questions - 5M

44. Write the elementary concept of BCS theory.
45. Write any 5 applications of superconductors.
46. Explain the concept of critical temperature and critical magnetic field.

P.R. GOVERNMENT COLLEGE (A) , KAKINADA

II B.Sc., Physics – Semester IV 2021-22

(ADD ON CERTIFICATE COURSE)

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

Total No. of hours : 30

APPLICATIONS OF SOLAR CELLS IN HOME ENERGY SYSTEMS

UNIT – I : 5 hrs.

Fundamentals of electric circuits :

Conductance, Resistance, Electrical Potential, Ohm's law, Photo electric effect, series and parallel circuits of Resistance and Potential difference.

UNIT – II : 5 hrs.

Types of Solar Cells:

Different types of Solar PV cells, Amorphous and crystalline Solar Cells, Efficiency of Solar cells, Advancements in Solar PV cells.

UNIT – III : 10 hrs.

Solar PV modules :

Series and Parallel connection of Solar cells, Design and structure of PV modules, Number of solar Cells in a module, Wattage of modules, Fabrication of PV modules.

UNIT – IV : 10 hrs.

Solar PV module system and trouble shoot :

Solar PV system connections, Solar Home systems (plug and play), Connecting a charge regulator/controller to the Solar Panel, Types of Solar Batteries, Connecting a Battery to a Solar system, Trouble shooting the Solar Battery, Connecting an Inverter to the Solar module, A Summary of the complete Solar system.

Text books & Reference books :

1.) Electrical Technology volumes by B.L. Theraja and A.K. Theraja.

2.) Build your own Solar Panel by Philip Hurley.

3.) Solar Photovoltaics Fundamentals, Technologies and Applications Third edition by Chetan Singh Solanki.

4.) Solar PV Training and Referral Manual SNV Zimbambwe.

P.R.GOVERNMENT COLLEGE (A), KAKINADA

Electricity, Magnetism & Electronics Lab

II B.Sc., Physics-Practical IV Semester - IV

w.e.f. 202-21 ADMITTED BATCH

Course Code : PH1202P(B) **No. of credits : 02**

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

Details of Lab/Practical/Experiments/Tutorials syllabus:

Minimum of 6 experiments to be done and recorded

1. Figure of merit of a moving coil galvanometer.

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

3. Determination of ac-frequency –Sonometer.

4. Verification of Kirchoff's laws and Maximum Power Transfer theorem.

5. Field along the axis of a circular coil carrying current-Stewart & Gee's apparatus.

6. PN Junction Diode Characteristics

7. Zener Diode –V-I Characteristics

8. Zener Diode as a voltage regulator

9. Transistor CE Characteristics- Determination of hybrid parameters

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

11. Verification of De Morgan's Theorems.

12. Construction of Half adder and Full adders-Verification of truth tables

13. Universal gates construction and verification of truth tables.

P.R.GOVERNMENT COLLEGE (A), KAKINADA
III B.Sc Physics Paper V – Semester – V
w.e.f. 2019-20 ADMITTED BATCH

Course Code : PH5203 **No. of credits : 03**
Electrostatic &Magnetostatics, 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 dipole moment 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& Introduction to Maxwell's Equations

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.

Maxwell's Equations –

Maxwell equations in integral and differential forms (No derivation), wave equation and wave velocity,Poyntingtheorem (Definition only).

UNIT-V (7 hrs)

5. Basic electronics:

Band theory of solids,***Basic semiconductor physics and P type and N type semiconductors***- PN juction diode, Zener diode I-V characteristics, ***Zener diode as voltage regulator***, PNP and NPN transistors, CB, CE and CC configurations – Relation betweenα, β and γ - transistor (CE) characteristics, 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.

Note: Topics in Bold & Italic are newly added from this academic year
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. 2017-18 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: 2 1/2Hrs. Max. Marks: 60

Section	Questions to be given	Questions to be answered	Marks
A	5	3	3 x 10M = 30M
B	9	6	6x5M= 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	--	2	--	10
III	1	--	1	15
IV	1	1	1	20
V	1	1	--	15
VI	1	1	1	20
Total Marks				95

Note: At least two problems should be answered.

QUESTION BANK

SUBJECT: PHYSICS PAPER: V SEMESTER: V

UNIT-I (Electric field intensity & Potential)

Essay questions-10M

44. State and Prove Gauss theorem in electrostatics
45. State Gauss theorem and derive an expression for the electric field due to uniformly charged sphere?
46. Define Electric potential. Calculate the electric potential due to a circular disc.
47. Define Electric dipole. Derive an expression for Electric potential due to a dipole.

Short questions- 5M

48. Derive an expression for electric potential due to a point charge
49. What are equipotential surfaces?
50. Derive an expression for Electric field intensity due to an infinitely conducting sheet

UNIT-II (Dielectrics)

Short questions- 5M

51. Define Electric Dipole Moment and molecular polarizability.
52. Define D, E and P and deduce relation between them.
53. Write a note on boundary conditions at dielectric surfaces?
54. Find the relation between Susceptibility and Dielectric Constant.

P.R.GOVERNMENT COLLEGE (A),KAKIINADA

III B.Sc., Physics-Practicals –paper VSemesters – V

w.e.f. 2019-20 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 – V
2019-20 Admitted batch

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

Modern Physics

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

UNIT-I (8 hrs)

1. Atomic physics

Introduction –Drawbacks of Bohr's atomic model -Vector atom model and Stern-Gerlach experiment - quantum numbers associated with it. L-S and j- j coupling schemes.***Selection rules, intensity rules,***Zeeman effect and its experimental arrangement, ***types of spectra***.

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 (9 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. Radioactive 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.

Note: Topics in Bold & Italic are newly added from this academic year

REFERENCE BOOKS

1. BSc Physics, Vol.4, Telugu Academy, 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)
2019-20ADMITTED 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: 2 1/2 Hrs. Max. Marks: 60

Section	Questions to be given	Questions to be answered	Marks
A	5	3	3 x 10M = 30M
B	9	6	6x5M= 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	--	15
III	--	2	1	15
IV	1	1	1	20
V	1	--	--	10
VI	1	1	--	15
Total Marks				95

Note: At least two problems should be answered.

QUESTION BANK

SUBJECT: PHYSICS PAPER: VI SEMESTER: V

UNIT-I (Atomic physics)

Essay Questions-10M

47. Explain the Quantum Numbers associated with Vector Atom model.
48. Describe the Stern and Gerlach experiment and indicate the importance of the results obtained.

Short Questions-5M

49. Explain L – S Coupling Scheme.
50. Explain j – j Coupling Scheme.
51. Explain different types of spectra
52. Explain the selection rules of L,S and J.
53. Explain Zeeman effect.

Problems-5M

54. Prove that for a given principal quantum number n,there are n^2 possible states each of which can accommodate a maximum of 2 electerons.
55. Consider a state with L=1 and S=1/2 .What are the possible spectrum terms.

UNIT-II (Molecular physics)

Essay Questions-10M

56. What is Raman effect? Explain the formation of Stoke's and Anti Stoke's lines on the basis of quantum theory.
57. What is Raman effect? How it is experimentally studied.Mention any two applications of Raman Effect

Problems-5M

58. The Exciting line in an experiment is 5460 A and the stokes line is at 5520 A^0.Find the wave length of anti – stokes line.
59. A sample was excited by 4358 A^0 line. A Raman line was observed at 4447 A^0. Calculate the Raman shift.

UNIT III(Matter waves & uncertainty principle)

Short Questions-5M

60. Write the properties of matter waves.
61. Describe the Davisson and Germer experiment.
62. What are matter waves? Derive an expression for de-Broglie wavelength of matter waves.
63. State and Explain Heisenberg's uncertainty principle.
64. Explain de – Broglie hypothesis of matter waves.
65. State Heisenberg's principle for Energy and Time.

Problems-5M

66. If the uncertainty in the momentum of an electron is 1.65×10^{-24} kg m/sec. calculate the uncertainty in its position.
67. Calculate the de-Broglie wavelength associated with a proton moving with a velocity equal to $1/20^{th}$ of the velocity of light. Mass of the proton is 1.67×10^{-27}kg)

UNIT – IV(Quantum mechanics)

Essay Questions-10M

68. Derive Schrodinger time dependent wave equation.
69. Derive Schrodinger time independent wave equation.
70. Obtain an expression for the energy of particle in one dimensional potential well of infinite height.

Short Questions-5M

71. Mention the basic postulates of quantum mechanics.
72. Explain the physical interpretation of wave function.
73. Explain Eigen finctions and Eigen values.

Problems-5M

74. Find the least energy of an electron moving in the dimension in an infinitely high potential box of width $1A^0$. Given mass of the electron $9.11x10^{-31}$ kg and $h=6.63x10^{-34}$ J-s
75. An electron is moving in one dimensional potential box of infinite height of width 25 A^O.Calculate the lowest energy of electron.

UNIT –V(General properties of Nuclei)

Essay Questions-10M

76. Explain liquid drop model in detail. Write its drawbacks.
77. Explain shell model of nucleus. Mention its merits and demerits.
78. Explain basic properties of nuclei.

UNIT –VI(Radio active decay)

Essay Questions-10M

79. Explain Gamow's theory of α-decay

Short Questions -5M

80. Write theGiger-Nuttal law for range of a α - particle.
81. Explain Neutrino hypothesis.

P.R.GOVERNMENT COLLEGE (A), KAKINADA

III B.ScPhysicsPractical-VI – Semester – V
w.e.f. 2019-20 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. 2019-20 ADMITTED BATCH

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 – Metallicbond – 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 defectsLinedefects- Surface defects- Volume defects- Production and removalofdefectsDeformation-irradiation- quenching- annealing- recovery - recrystallization andgraingrowth. Diffusion in solids- Fick's laws of diffusion.

UNIT-III(9 hrs)

3. Mechanical Behavior of Materials: Different mechanical properties of engineeringmaterials – Creep – Fracture – Technologicalproperties – Factors affecting mechanicalproperties of a material – Heat treatment - Cold andhot working – Types of mechanicaltests – 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 BHCurve.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

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P.R.GOVERNMENT COLLEGE (A), KAKINADA
III B.Sc Physics Paper
Elective Paper VII(B) – Semester – VI – Model Paper
w.e.f. 2019-20 ADMITTED BATCH

2019 - 2020

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: 2 1/2 Hrs. Max. Marks: 60

Section	Questions to be given	Questions to be answered	Marks
A	5	3	3 x 10M = 30M
B	9	6	6x5M= 30M
Total	14	9	60M

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
		Total	95

P.R.GOVERNMENT COLLEGE (A), KAKINADA

III B.Sc Physics Practical– **VIIB – Semester – VI**
w.e.f. 2019-20 ADMITTED BATCH

Duration : 3 hrs

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.

P.R.GOVERNMENT COLLEGE (A), KAKINADA
III B.Sc Physics Paper – VII(C) – Semester – VI
w.e.f. 2019-20 ADMITTED BATCH

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.

U**NIT-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, Pennwellcorporation (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 – VII C – Semester – VI – Model Paper
w.e.f. 2019-20 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: 2 1/2 Hrs. Max. Marks: 60

Section	Questions to be given	Questions to be answered	Marks
A	5	3	3 x 10M = 30M
B	9	6	6x5M= 30M
Total	14	9	60M

Blue Print

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

QUESTION BANK

SUBJECT: PHYSICS **PAPER: VII** **SEMESTER: VI**

RENEWABLE ENERGY

UNIT-I (Introduction to Energy&Environmental effects)

Essay Questions-10M

82. State law of conservation of energy. Explain different forms of energy.
83. Explain the energy flow diagram to the earth from the sun.
84. Briefly discuss about global warming.
85. Explain the environmental impact of nuclear power of generation.
86. Explain hydroelectric power stations on ecology and environment.

Short Questions - 5M

87. Define energy and power. Write its units.
88. Write a short note on depletion of ozone layer.
89. Explain about air pollution.
90. Explain about water pollution.
91. What is green house effect?

UNIT-II (GlobalEnergy Scenario& Indian Energy Scene)

Essay Questions-10M

92. Explain the global energy consumption in various sectors.
93. What are the options to generate electricity?
94. Discuss different conventional energy sources available in India.
95. Discuss different non-conventional energy sources available in India.
96. Explain how the energy consumed in urban and rural India.

Short Questions-5M

97. Explain about fossil fuel.
98. What are the renewable and non renewable energy sources?
99. Why we need new and renewable energy sources.
100. Compare renewable and non renewable energy sources.
101. Explain about fossil fuel.

UNIT-III (Solar energy)

Short Questions-5M

102. What is solar water heating system? How does it work?
103. Explain about solar energy.
104. What is solar cell? Explain its working principle and draw V-I characteristics.
105. Describe different types of solar cookers.
106. Explain various types of solar cells.

UNIT-IV (Wind Energy)

Essay Questions-10M

107. What are the components of wind terbine? Explain their operation.
108. What are the characteristics of a wind turbine?

Short Questions-5M

109. What are the basic principles of wind energy conversion?
110. Write applications of wind energy.

UNIT V (Ocean Energy& Hydrogen Energy)

Essay Questions - 10M

111. Explain the principle and working of tidal power generation.
112. What are the technologies used to obtain tidal energy.
113. Explain Hydrogen production methods.

Short Questions-5M

114. Explain the principle of ocean thermal energy conversion.
115. Derive an expression for total energy generated from the ocean waves.
116. Write the uses of hydrogen as a fuel.

UNIT –VI (Bio-Energy)

Essay Questions-10M

117. Explain aerobic and anaerobic bio-conversion.
118. Explain Biomass energy conversion through fermentation-pyrolysis.
119. Explain bio mass conversion through Gasification and Combustion.

Short Questions - 5M

120. Write the properties and characteristics of Biomass.
121. How energy produced from biomass.
122. Explain the sources of biomass.

P.R.GOVERNMENT COLLEGE (A), KAKINADA

III B.ScPhysicsPractical– VIIC – Semester – VI
w.e.f. 2019-20 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

P.R.GOVERNMENT COLLEGE (A), KAKINADA
III B.Sc Physics Paper – VIII(B) – Semester – VI
w.e.f. 2019-20 ADMITTED BATCH

No. of credits : 03

Elective Paper VIII(B 1): Fundamentals of Nanoscience

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

UNIT-I (5 hrs)

1. Background and history: Emergence of Nanoscience with special reference to Feynmanand Drexler; Role of particle size; Spatial and temporal scale; Concept of confinement,strong and weak confinement with suitable example;

UNIT-II (5 hrs)

2. Quantum Structures: 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 andInterfacial Energies. Physics of the solid state – size dependence of properties, crystalstructures, Lattice vibrations, Energy bands:- Insulators Semiconductors and conductors.

UNIT-III (9hrs)

3. Classification of Nanomaterials: Inorganic nanomaterials: carbon nanotubes and cones,Organic nanomaterials: dendrimers, micelles, liposomes, block copolymers;Bionanomaterials: Biomimtric, bioceramic and nanotherapeutics; Nanomaterials formolecular electronics and optoelectronics.

UNITS-IV (9hrs)

4. Macromolecules: Classification of polymers, chemistry of polymerization, chain polymerization, step polymerization, coordination polymerization. Molecular weight ofpolymers-number average and weight average molecular weight, degree of polymerization,determination of molecular weight of polymers by viscometry,

UNIT-V (8hrs)

5. Molecular &Nanoelectronics:Semiconductors, Transition from crystal technology tonanotechnology. Tiny motors, Gyroscopes and accelerometers. Nano particle embeddedwrinkle resistant cloth, Transparent Zinc Oxide sun screens.

UNIT-VI (9hrs)

6. 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 andadhesives, 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. 2019-20 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: 2 1/2 Hrs. Max. Marks: 60

Section	Questions to be given	Questions to be answered	Marks
A	5	3	3 x 10M = 30M
B	9	6	6x5M= 30M
Total	14	9	60M

Blue Print

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

P.R. GOVERNMENT COLLEGE (A), KAKINADA

III B.Sc Physics Practical– VIII (B 1) – Semester – VI
W.e.f. 2019-20 ADMITTED BATCH

Fundamentals of Nano 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 Nanorods into Gold Nan particles
4. Bimetallic Nan particles
5. Processing and Development of Nan particle gas sensor
6. Magnetic separation/identification studies of nanoparticles
7. Harvesting light using nano-solar cells
8. Nano-Forensic analysis to identify, individualize and evaluate evidence using nanophasematerials
9. Comparison of the performance of nanoparticles based conductive adhesives andconventional non conductive adhesives.
10. Electrode position and corrosion behavior of nanostructured composite film
11. Photocatalytic activity of nanomaterials

P.R. GOVERNMENT COLLEGE (A), KAKINADA

III Bask Physics Elective Paper VIII (B 2) – **Semester – VI**
W.e.f. 2019-20 ADMITTED BATCH

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

Synthesis and Characterization of Nanomaterials

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

Unit-I (5 hrs)
1. Nanomaterials synthesis: Synthesis and nanofabrication, Bottom-Up and Top-Downapproach with examples. Chemical precipitation methods, sol-gel method, chemicalreduction, hydrothermal, process.

Unit-II (5 hrs)
2. Nano materials synthesis – II: Physical Methods- ball milling, Physical Vapour deposition (PVD), Sputtering, Chemical Vapor deposition (CVD), pray pyrolysis,

Unit-III (9 hrs)
3. 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-IV (9 hrs)
4. 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-V (9 hrs)
5. 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-VI (9 hrs)
6. 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 toX, Campus books.

2. Nano: The Essentials-Understanding Nanoscience& Nanotechnology by T.Pradeep; TataMc. Graw Hill

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

4. Nanoelectronic Circuit Design, N.K Jha, D Chen, Springer

5. Handbook of Nanophysics- Nanoelectronics & Nanophotonics, K.D Sattler, CRC Press

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

P.R. GOVERNMENT COLLEGE (A), KAKINADA
w.e.f. 2019-20 ADMITTED BATCH

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: 2 1/2 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	Marks allotted
I	---	2	10
II	1	---	10
III	1	2	20
IV	1	2	20
V	1	1	15
VI	1	2	20
Total			95

P.R. GOVERNMENT COLLEGE (A), KAKINADA

III B.Sc PhysicsPractical– VIII (B 2) – Semester – VI
W.e.f. 2019-20 ADMITTED BATCH

Cluster Elective: VIII (B2) - Synthesis and Characterization of Nanomaterials

Credits: 02 Duration: 2 hrs/Week

Minimum of 6 experiments to be done and recorded

1. Synthesis of nanocrystalline films of II-VI compounds doped with rare earths by chemicalprocess.
2. Synthesis of Alkaline earth aluminates in nanocrystalline 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 nanofilter by polymerisation reaction
6. Absorption studies on the nanocrystalline films and determination of absorptioncoefficient.
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 andstudy of temperature variation of electrical conductivity.

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III Bask Physics Elective Paper VIII (B 3) – **Semester – VI**
W.e.f. 2019-20 ADMITTED BATCH

Course Code:Cluster Elective VIII (B 3) **No. of credits: 03**

Applications of Nano materials and Devices

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

UNIT-I (9 hrs)
1. Optical properties: Coulomb interaction in nanostructures. Concept of dielectric Constant for nanostructures and charging of nano structure. Quasi-particles and Excitons.Excitons in direct and indirect band gap semiconductor nano crystals. Quantitative treatment of quasi-particles and excitons, charging effects.

2. UNIT-II (9 hrs)
2. Electrical transport:
Carrier transport in nanostrcutures. Halleffect, extermination of carrier mobility and carrier concentration; Coulomb blockade effect, thermionic emission, tunneling and hoping conductivity. Defects and impurities: Deep level and surface defects.

UNIT-III (9 hrs)
3. Applications: Applications of nano particles, quantum dots, nano wires and thin films for photonic devices (LED, solar cells). Single electron transfer devices (no derivation). CNT based transistors. Nano material Devices: Quantum dots hetero structures lasers, optical switching and optical data storage.

UNIT-IV (8 hrs)
4. Nanoelectronics: Introduction, Electronic structure of Nanocrystals, Tuning the Band gap ofNano scale semiconductors, Excitons, Quantum dot, Single electron devices, Nano structuredferromagnetism, Effect of bulk nano structuring of magnetic properties,

UNIT-V (5 hrs)
5. Nan biotechnology: Introduction, Biological building blocks size of building blocks and nanostructures, Peptide nano wires and protein nano particles.

UNIT-VI (5 hrs)
6. Medical application:
DNA double nano wires, Nan materials in drug delivery and therapy, Nano medicine, Targeted gold nano particles for imaging and therapy.

Reference books:
1.C.P. Poole, Jr. Frank J. Owens, Introduction to Nanotechnology (Wiley India Pvt. Ltd.).
2.S.K. Kulkarni, Nanotechnology: Principles & Practices (Capital Publishing Company).

3. K.K. Chattopadhyay and A.N. Banerjee, Introduction to Nanoscience& Technology (PHI Learning Private Limited).
4. Richard Booker, Earl Boysen, Nanotechnology (John Wiley and Sons).

P.R. GOVERNMENT COLLEGE (A), KAKINADA
w.e.f. 2019- 20 ADMITTED BATCH

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: 2 1/2 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	Marks allotted
I	1	2	20
II	1	2	20
III	1	2	20
IV	1	1	15
V	1	---	10
VI	---	2	10
Total			95

P.R. GOVERNMENT COLLEGE (A), KAKINADA

III B.Sc PhysicsPractical– VIII (B 3) – Semester – VI
W.e.f. 2019-20 ADMITTED BATCH

Cluster Elective: VIII (B 3) - Synthesis and Characterization of Nanomaterials

Credits: 02 Duration: 2hrs/Week

Minimum of 6 experiments to be done and recorded

1. Synthesis of metal nanoparticles by chemical route.
2. Synthesis of semiconductor nanoparticles.
3. Surface Plasmon study of metal nanoparticles by UV-Visible spectrophotometer.
4. XRD pattern of nanomaterials and estimation of particle size.
5. To study the effect of size on color of nanomaterials.
6. Prepare a disc of ceramic of a compound using ball milling, pressing and sintering, and study its XRD.
7. Fabricate a thin film of nanoparticles by spin coating (or chemical route) and study transmittance spectra in UV-Visible region.
8. Fabricate a pn-diode by diffusing Al over the surface of n-type Si and study its I-V characteristics.

(OR)

PROJECT

P.R. GOVERNMENT COLLEGE (A), KAKINADA
III B.Sc Physics Paper – VIII(C) – Semester – VI
w.e.f. 2019-20 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 andschottky 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

P.R. GOVERNMENT COLLEGE (A), KAKINADA
w.e.f. 2019 - 20 ADMITTED BATCH

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: 2 1/2 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	Marks allotted
I	---	2	10
II	1	---	10
III	1	1	15
IV	1	2	20
V	1	2	20
VI	1	2	20
Total			95

QUESTION BANK

SUBJECT: PHYSICS PAPER: VIII C1 SEMESTER: VI

SOLAR THERMAL AND PHOTOVOLTAIC ASPECTS

UNIT – I (Basics of Solar Radiation)

Short Questions – 5 M

1. Briefly explain about Pyro heliometers.
2. Define solar constant also derive the value for solar constant.
3. Explain the structure of Sun.
4. Explain the concept of Zenith angle and Air mass in brief.
5. Define Declination, Hour angle, Solar and Surface azimuth angles.
6. Explain Direct, diffuse and total solar radiation in brief

UNIT – II (Radiative properties and characteristics of Materials)

Essay Questions – 10 M

7. Define Kirchhoff's law and also derive the relation between absorptance,emittance and reflectance
8. Write a note on selective surfaces preparation and characterization, explain its types.
9. Write a note on Anti reflective coating.

UNIT – III (Flat Plate Collectors)

Essay Questions – 10 M

10. Give the description of flat plate collector and explain about Liquid heating type FPC
11. Discuss about temperature distribution in FPC

Short Questions – 5 M

12. Write a note on energy balance equation and efficiency of FPC
13. Define fin efficiency and collector efficiency.
14. Write a note on evacuated tubular collectors.

UNIT – IV (Solar Photovoltaic (PV) cell)

Essay Questions – 10 M

15. Explain variation of efficiency with band –gap and temperature
16. Discuss various types of interfaces

Short Questions – 5 M

17. Explain Photo Voltaic Effect.
18. Draw the equivalent circuit of solar cell and write the solar cell output parameters
19. What are Series and shunt resistances and explain its effect on cell efficiency.
20. Write a short note on solar cells.

UNIT – V (Solar PV systems)

Essay Questions – 10 M

21. Write down the steps involved in the fabrication of solar module
22. Explain solar PV system and its components

Short Questions – 5 M

23. Write about solar module protection.
24. Explain performance and I-V characteristics of a solar module.
25. Write a note solar modules in series and parallel combinations

UNIT – VI (Solar thermal applications)

Essay Questions – 10 M

26. Explain different typessolar hot water systems (SHWS).
27. Explain standard method of testing the efficiency of SHWS.

Short Questions – 5 M

28. Explain Solar thermal power generation.
29. Write short note on solar desalinator and drier.
30. Write a note on Passive space heating and cooling concepts

P.R. GOVERNMENT COLLEGE (A), KAKINADA

III B.Sc PhysicsPractical– VIII (C 1) – Semester – VI
W.e.f. 2019-20 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 pyranometer.
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. 2019-20 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 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.

P.R. GOVERNMENT COLLEGE (A), KAKINADA
w.e.f. 2019-20 ADMITTED BATCH

ClusterElective Paper VIII(C 2): Wind, Hydro and Ocean Energies

Course Code : Cluster ElectiveVIII(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: 2 1/2 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	10	30M

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	1	15
V	--	2	10
VI	1	1	15
Total			95

QUESTION BANK

SUBJECT: PHYSICS PAPER: VIII C2 SEMESTER: VI

WIND, HYDRO & OCEAN ENERGIES

UNIT – I (Introduction)

Essay Questions – 10 M

1. Explain the nature of variation of wind speed with height from the ground.
2. Explain types and classification of WECS.

Short Questions – 5 M

3. Write a short note on wind generations.
4. Classify categories of winds.
5. Explain distribution of wind around the world.
6. Describe the principles of Wind energy conversions.

UNIT – II (Wind Energy Conversion System)

Essay Questions – 10 M

7. Explain Rotor characteristics of a wind turbine.
8. Explain blade element theory to analyse the aerodynamics of the wind turbines.

Short Questions – 5 M

9. Explain maximum power coefficient in wind turbines.
10. Describe Aerodynamic design principle.
11. Explain axial momentum theory to analyse the aerodynamics of the wind turbines in brief.

UNIT – III (Wind Energy Application)

Essay Questions – 10 M

12. Explain Performance analysis and design concept of wind pumps.
13. Explain Environmental impacts of wind farms

Short Questions – 5 M

14. Discuss wind energy in India.
15. Write the principle of wind generation.
16. Describe how wind pumps are testing.

UNIT – IV (Small Hydropower Systems)

Essay Questions – 10 M

17. Explain overview of micro, mini and small hydro systems

Short Questions – 5 M

18. Write about site selection of pumps and turbines.
19. Explain briefly about speed and voltage regulation of hydro power systems.

UNIT – V (Ocean ThermalEnergy Systems)

Short Questions – 5 M

20. Write any six applications of OTEC.
21. Explain open cycle method of electricity generation from OTEC.
22. Explain closed cycle method of electricity generation from OTEC.
23. Write the advantages & disadvantages of ocean thermal energy.
24. Explain the working principle of ocean thermal energy conversion.

UNIT – VI (Tidal and Wave Energy Systems)

Essay Questions – 10 M

25. Explain wave energy conversion devices.
26. Discuss the origin and nature of tidal energy

Short Questions – 5 M

27. Discuss the applications of wave energy.
28. What are the advantages and disadvantages of wave energy.

P.R. GOVERNMENT COLLEGE (A), KAKINADA
III B.Sc PhysicsPractical– VIII (C 2) – Semester – VI
w.e.f. 2019-20 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
III B.Sc Physics Paper – VIII(C 3) – Semester – VI
w.e.f. 2019-20 ADMITTED BATCH
Course Code : Cluster Elective VIII(C 3) No. of credits : 03

Cluster Elective Paper VIII(C 3): Energy storage devices

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

UNIT-I(5hrs)
1. Energy Storage: Need of energy storage; Different modes of energy storage, Flywheel storage, Electrical and magnetic energy storage: Capacitors, electromagnets

UNIT-II(5hrs)
2. Chemical Energy storage: Thermo-chemical, photo-chemical, electro-chemical, Hydrogen for energy storage.

UNIT-III(9hrs)
3. Electrochemical Energy Storage Systems: Batteries: Primary, Secondary, Lithium, Solid-state and molten solvent batteries; Lead acid batteries; Nickel Cadmium Batteries; Advanced Batteries. Role of carbon nano-tubes in electrodes

UNIT-IV(9hrs)
4. Magnetic and Electric Energy Storage Systems: Superconducting Magnet Energy Storage(SMES) systems; Capacitor and battery: Comparison and application; Super capacitor.

UNIT-V(8 hrs)
5. Fuel Cell: Fuel cell definition, difference between batteries and fuel cells, fuel cell components, principle and working of fuel cell, performance characteristics, efficiency, Advantages and disadvantages of fuel cell.

UNIT-VI (9 hrs)
6. Types of Fuel Cells: Classification, Alkaline fuel cell, phosphoric acid fuel cell, molten carbonate fuel cell; solid oxide fuel cell, proton exchange membrane fuel cell, applications of fuel cells.

Reference Books:

1. J. Jensen and B. Squrensen, Fundamentals of Energy Storage, John Wiley, NY, 1984.
2. M. Barak, Electrochemical Power Sources: Primary and Secondary Batteries by, P. Peregrinus,IEE,1980.
3. P.D.Dunn, Renewable Energies, Peter Peregrinus Ltd, London, 1986.
4. B.Viswanathan and M. A. Scibioh, Fuel Cells-Principles and Applications, University Press, 2006.
5. Hart, A.B and G.J.Womack, Fuel Cells: Theory and Application, Prentice Hall, NewYork, 1989.

P.R. GOVERNMENT COLLEGE (A), KAKINADA
III B.Sc Physics Paper – VIII(C 3) – Semester – VI
w.e.f. 2019-20 ADMITTED BATCH
Course Code : Cluster Elective VIII(C 3) **No. of credits : 03**

Energy storage devices

Note:-Set the question paper as per the blue print given at the end of this model paper.
Time: 2 1/2 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	Marks allotted
I	1	---	10
II	---	2	10
III	1	2	20
IV	1	1	15
V	1	2	20
VI	1	2	20
Total			95

QUESTION BANK

SUBJECT: PHYSICS **PAPER: VIII C 3** **SEMESTER: VI**

ENERGY STORAGE DEVICES

UNIT – I (Energy Storage)

Essay Questions – 10 M

31. Explain Flywheel storage, Electrical and Magnetic energy storages.
32. Explain how capacitors and electromagnets are used for energy storage.

UNIT – II (Chemical Energy storage)

Short Questions – 5 M

33. Explain thermo - chemical energy storage.
34. Explain photo - chemical energy storage.
35. Explain electro - chemical energy storage.
36. Explain how Hydrogen is used as energy storage.

UNIT – III (Electrochemical Energy Storage Systems)

Essay Questions – 10 M

37. Discuss solid state and molten solvent batteries.
38. Discuss Lead acid batteries and Nickel Cadmium Batteries.

Short Questions – 5 M

39. Discuss the role of carbon nano tubes in electrodes.
40. Write a note on Lithium batteries.
41. What are Primary & Secondary cells? What are its uses and defects.

UNIT – IV (Magnetic and Electric Energy Storage Systems)

Essay Questions – 10 M

42. Explain super conducting magnet energy storage(SMES) systems.
43. Compare capacitor and battery and write its applications.

Short Questions – 5 M

44. Write a note on super capacitors.

UNIT – V (Fuel Cell)

Essay Questions – 10 M

45. Explain the principle and working of a fuel cell. Derive the efficiency of a fuel cell.

Short Questions – 5 M

46. Write the differences between Batteries and fuel cells.
47. Write the advantages and disadvantages of fuel cells.
48. What is fuel cell? Write its components.

UNIT – VI (Types of Fuel Cells)

Essay Questions – 10 M

49. Classify fuel cells. Explain Alkaline fuel cell and Phosphoric acid fuel cell.
50. Classify fuel cells. Explain Molten carbonate fuel cell and Solid oxide fuel cell.

Short Questions – 5 M

51. Explain proton exchange membrane fuel cell.
52. Write application of fuel cells.

P.R. GOVERNMENT COLLEGE (A), KAKINADA
III B.Sc PhysicsPractical– VIII (C 2) – Semester – VI
w.e.f. 2019-20 ADMITTED BATCH

Cluster Elective: VIII (C3)–Energy Storage Devices

Credits : 02 Duration: 2hrs/Week

1. Study of charge and discharge characteristics of storage battery.
2. Study of charging and discharging behavior of a capacitor.
3. Determination of efficiency of DC-AC inverter and DC-DC converters
4. Study of charging characteristics of a Ni-Cd battery using solar photovoltaic panel.
5. Performance estimation of a fuel cell.
6. Study of effect of temperature on the performance of fuel cell.

OR

PROJECT

P.R. GOVERNMENT COLLEGE (A), KAKINADA

DEPARTMENT OF PHYSICS & ELECTRONICS

WORK LOAD FOR THE YEAR 2021-22

Name of the Subject : PHYSICS

Total No. of Hours : **185**

No. of Permanent posts sanctioned : **09**

No. of Permanent staff working : **07+02**

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 EM (1)	4	2	3	6	10
2	30	I MPC EM (2)	4	2	3	6	10
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	II MPC EM	4	2	2	4	8
7	30	II MPE	4	2	2	4	8
8	30	II MPCS	4	2	2	4	8
9	60	III MPC TM Sem V Paper V	3	2	4	8	11
10	60	III MPC TM Sem V Paper VI	3	2	4	8	11
11	30	III MPC EM Sem V Paper V	3	2	2	4	7
12	30	III MPC EM Sem V Paper VI	3	2	2	4	7
13	30	III MPE Sem V Paper V	3	2	2	4	7
14	30	III MPE Sem V Paper VI	3	2	2	4	7
15	30	III MPCS Sem V Paper V	3	2	2	4	7
16	30	III MPCS Sem V Paper VII	3	2	2	4	7
17	30	III MPC TM Sem VI Paper VII	3	2	2	4	7
18	30	III MPC EM Sem VI Paper VII	3	2	2	4	7

19	30	III MPE Sem VI Paper VII	3	2	2	4	7
20	30	III MPCS Sem VI Paper VII	3	2	2	4	7
21	30	Cluster 8A	3	2	2	4	7
22	30	Cluster 8B	3	2	2	4	7
23	30	Cluster 8C	3	2	2	4	7
		Total Work load for the department of PHYSICS					**185**

P.R. GOVERNMENT COLLEGE (A), KAKINADA

DEPARTMENT OF PHYSICS & ELECTRONICS

WORK LOAD FOR THE YEAR 2021-22

Name of the Subject : ELECTRONICS

Total No. of Hours : **104**

	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	I MEIot	4	2	2	4	8
4	30	II MPE	4	2	2	4	8
5	30	II MECS	4	2	2	4	8
6	30	II MEIot	4	2	2	4	8
7	30	III MPE Sem V Paper V	3	2	2	4	7
8	30	III MPE Sem V Paper VI	3	2	2	4	7
9	30	III MECS Sem V Paper V	3	2	2	4	7
10	30	III MECS Sem V Paper VI	3	2	2	4	7

11	30	Cluster Sem VI Paper VII A	3	2	2	4	7
12	30	Cluster Sem VI Paper VIII A	3	2	2	4	7
13	30	Cluster Sem VI Paper VIII B	3	2	2	4	7
14	30	Cluster Sem VI Paper VIII C	3	2	2	4	7
		Total Work load for the department of ELECTRONICS					**104**

DEPARTMENT OF PHYSICS & ELECTRONICS

WORK LOAD FOR THE YEAR 2021 - 22

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

Total No. of Hours : **64**

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	4	12	32
2	30	II MSc	20	3	4	12	32
		Total Work load for M Sc Physics					**64**

Consolidated Work Load for the Academic Year 2021-22

Group	Work Load	Staff Required
Physics	185	9
Electronics	104	5
M Sc	64	3
Total Work Load	**353**	**17**

P R GOVT COLLEGE (A), KAKINADA

LIST OF EXAMINERS/ PAPER SETTERS IN PHYSICS

2021-2022

S.No.	Name of the examiner	Subject	Name of the College
1	L.MalleswaraRao 9985137973	Physics	Y.N.College, Narsapur
2.	Dr.A.NirmalaJyotsna 9490171202	Physics	St.Theresa College for Women, Eluru
3	R.Venkateswararao 9440119231	Physics	M.S.N.Charties, Kakinada
4	K.AnandaRao	Physics	C.R.R. College (M), Eluru
5	K.Ramesh	Physics	C.R.R. College (M),Eluru
6	K.B.S.Gopal	Physics	C.R.R. College (M),Eluru
7	P.P.Divakar	Physics	C.R.R. College (M), Eluru
8	A.VeerabhadraRao	Physics	C.R.R. College (M),Eluru
9	L.S.R.Ch.V.K.Nageswararao	Physics	C.R.R. College (M),Eluru
10	R.SuryanarayanaRaju	Physics	K.G.R.L.College , Bhimavaram
11	Smt.V.Vidyamallika	Physics	K.G.R.L.College , Bhimavaram
12	P.Rajyalakshmi	Physics	C.R.R. College (W), Eluru
13	K.Sireesha	Physics	C.R.R. College (W), Eluru
14	M.Jayalakshmi Devi	Physics	C.R.R. College (W), Eluru
15	P.Himakar	Physics	S.K.B.R.College, Amalapuram
16	N.S.Satyanarayana Murthy	Physics	S.K.B.R.College, Amalapuram
17	K.Nagavarma	Physics	S.K.B.R.College, Amalapuram
18	V.V.SubbaRao	Physics	S.K.B.R.College, Amalapuram
19	J.PrabhakaraRao	Physics	S.K.B.R.College, Amalapuram
20	S.V.KumaraSastry	Physics	S.K.B.R.College, Amalapuram
21	V.Radha Krishna	Physics	S.K.B.R.College, Amalapuram
22	K.SrinivasaRao	Physics	Govt. College , Kothapeta
23	ValluriSrinivasaRao	Physics	Govt. College (women) Nidadavolu
24	T.K.VisweswaraRao	Physics	Govt. College(women), Nidadavolu
25	E.NageswaraRao	Physics	Govt. College, Eleswaram
26	Dr.K.RamachandraRao	Physics	Govt. College (A), Rajahmundry
27	EsubBasha Sheik	Physics	Govt. College (A), Rajahmundry
28	Dr.B.V.Tirupanyam	Physics	Govt. College , Narayanapuram
29	VobhilineniSrinivasaRao	Physics	Govt. College , Ramachandrapuram
30	N LV R K Prasad	Physics	Govt. College , Ramachandrapuram

31	P.S. Brahamachari	Physics	Govt. College , Tadepalligudem
32	K.Ganesh Kumar	Physics	Govt. College , Tadepalligudem
33	P. V. L.Narayana	Physics	GDC Tanuku
34	M.Sudhadhar	Physics	GDC Tanuku
35	B.DurgaLakshmi	Physics	GDC Tanuku
36	T.Y.H.A.G.Gandhi	Physics	Govt. College , Ravulupalem
37	Dr. A.R.S. Kumar, Reader	Physics	Y.N. College (A), Narasapur
38	A.P.V. AppaRao	Physics	Y.N. College (A), Narasapur
39	J. Rammohan	Physics	Y.N. College (A), Narasapur
40	P. Rama Krishna Rao	Physics	Y.N. College (A), Narasapur
41	D. Gangadharudu	Physics	M.R. College, Peddapuram
42	A.Satyanarayana Murthy	Physics	M.R. College, Peddapuram
43	N. Veer Kumar	Physics	M.R. College, Peddapuram
44	N. Sridhar	Physics	M.R. College, Peddapuram
45	S. Rama Rao	Physics	M.R. College, Peddapuram
46	K.G. KrishnamRaju	Physics	D.N.R. College (A), Bhimavaram
47	S. VenkataRaju	Physics	D.N.R. College (A), Bhimavaram
48	Smt. M. Satyavani	Physics	D.N.R. College (A), Bhimavaram
49	M.V.S. Prasad	Physics	D.N.R. College (A), Bhimavaram
50	Smt. N. Udaya Sri	Physics	D.N.R. College (A), Bhimavaram
51	A. Veeraiah	Physics	D.N.R. College (A), Bhimavaram
52	S.S.R. Murthy	Physics	Ideal College (A), Kakinada

P. R. GOVERNMENT COLLEGE (A), KAKINADA

Department of Physics & Electronics
Departmental Activities Planned for 2021-2022

The department of Physics and Electronics is planning the following programmes to conduct for the academic year 2021-2022

S. No.	Activity	Probable date	Remarks
1	Post admission test, Student Counseling Discussion on Result Analysis	Oct4th week	
2	Sensitization on Departmental Activities particularly on Kasarabada Scholarship and Endowment Prizes	Oct4th week	
3	Disbursement of Kasarabada Scholarship both for UG and PG	Nov 2nd week	
4	Celebration of Sir C.V.Raman's Birth day Guest lecture - 1	November 7th	
5	Inaugural function of Photon club, International Online Webnar	Nov3rdweek	
6	Launching Upkar Scheme	Nov4thweek	
7	Extension activity to local high schools	Dec 2nd week	
8	Awareness programme on IMD	Dec3rd week	
9	Guest Lecture -2	Jan 1st week	
10	Study Area Programme	Jan4th week	
11	Parent Teacher Meeting	Feb 1stweek	
13	Workshop / Intercollegiate Science Competitions	February 2nd week	
14	Student Counseling before commencement of semester end exams	Feb 4th week	
15	National Science day celebrations	February 28th	
16	Guest Lecture - 3	Mar 2nd week	
17	Student Counseling after commencement of semester end exams	April4th week	

18	Online Quiz programme	May 2nd week	
19	College level Chess Competition	June3rdweek	
20	Guest Lecture - 4	July 1st week	
21	Observing Hiroshima Day	August 1st week	
22	UPKAR scheme – Disbursement of money to the students	August 2nd week	

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 **2021-2022**, list of examiners and paper setters, departmental activities which contains pages , is approved in the Board of Studies meeting held in the Department of Physics and Electronics on

12- 11 - 2021.

Members of Board of Studies			**Signatures of members**
1	Sri U.V.B.B. Krishna Prasad	Chair person	
2	Dr. P. Paul Diwakar	University nominee, Lec.In Phy,Y.V.N.R. Government college, Kaikaluru.	
3	Dr. K. Jyothi	Subject Expert, Lec.in charge/ phy/Govt. College, Ramachandrapuram.	
4	Sri K. VenkateswaraRao	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	Alumni	
7	Sri G. Sridevi	Member	
8	Sri M. Surekha	Member	
9	Sri R. Tejeswara Rao	Member	
10	Sri K. Durga Rao	Member	
11	A Mercy I B.Sc MPC	Student Member	
12	Pranetha, III MPC EM	Student Member	
13	K. Anusha, III MPCs	Student Member	
14	D. Shankar Naik, III MPC EM	Student Member	

From

U V B B Krishna Prasad
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 Physics–Reimbursement of Amount--request – Reg.

I hereby submit __ vouchers\bills (Physics -)for an amount of
Rs. -(Physics – Rs. /-)which was spent by me for BOS meetings in Physics on. Iam here with enclosing a statement showing the said expenditure for your kind perusal.

S. No.	Subject	Expenditure	To be reimbursed
1	Physics		
2			
3			
4			
TOTAL			

Thanking you Sir

Yours faithfully,

STATEMENT FOR EXPENDITURE

Physics BOS Bills

S.No.	Voucher no./Bill no.	Description	Amount
1			
2			
3			
4			
5			
6			
7			