

QUESTION BANK FOR SEMESTER -I
GOVERNMENT COLLEGE (A) RAJAHMUNDRY

WAVE OPTICS

CHAPTER –I **INTERFERENCE**

LONG ANSWER TYPE QUESTIONS (7 MARKS)

1. Explain the occurrence of Interference fringes in Lloyd's Arrangement. Explain the type of fringes obtained it.
2. Explain the occurrence of Interference fringes in Lloyd's Arrangement .How the wavelength of light can be determined through it.
3. What is wedge shaped film .Describe the fringes observed when a wedge shaped film is illuminated by light. Calculate the separation between two consecutive bright and dark bands.
4. Describe how the wavelength of sodium light can be determined using Newton rings. Derive the formula used for it.
5. Describe Newton rings method for measuring the wavelength of monochromatic light. Give the necessary theory.
6. Describe the Principle, construction and working of a Michelson Interferometer. Explain how the wavelength of light is determined with it.

SHORT ANSWER TYPE QUESTIONS (3 MARKS)

1. What are the conditions of interference?
2. Explain the cosine law.
3. Explain the formation of colors in thin films.
4. Write a note on Interference fringes by wedge shaped films.

CHAPTER –II **DIFFRACTION**

LONG ANSWER TYPE QUESTIONS (7MARKS)

1. Describe the Fraunhofer Diffraction due to a single slit and deduce the positions of maxima and minima.
2. Describe the Fraunhofer Diffraction due to a single slit. Draw the respective graph of the Intensity distribution.
3. What is a grating? Find conditions for Principal maxima, minima in Fraunhofer diffraction pattern with N slit.
4. Explain how plane transmission grating is used to determine the wavelength of the given light.
5. What is Fresnel's half period zones. Give the theory of Fresnel's diffraction of light .Explain the intensity distribution in diffraction pattern.
6. Explain Fresnel's half period zones. Derive an expression for the amplitude due to nth zone.
7. What is a zone plate? How is it constructed? Show that it acts as a convex lens of different focal lengths.

SHORT ANSWER TYPE QUESTIONS (3 MARKS)

1. Give the differences between Fraunhofer and Fresnel's diffraction.
2. Distinguish between Interference and Diffraction.
3. Compare zone plate and convex lens.
4. Obtain the formula for resolving power of Grating.
5. Define and explain diffraction with at least two examples.

CHAPTER –III **POLARIZATION**

LONG ANSWER TYPE QUESTIONS (7 MARKS)

1. Explain the construction and working of Nicol Prism.
2. What is a Nicol prism? Explain how it works as Analyzer and Polarizer.
3. What is optical activity? Describe how the specific rotation of sugar solution is determined experimentally.
4. Define specific rotation. Describe the construction and working of Laurant's half shade polarimeter.
5. Define specific rotation. Explain how you would use it to determine the specific rotation of sugar solution.

SHORT ANSWER TYPE QUESTIONS (3 MARKS)

1. State and explain Brewster's law.
2. State and Explain malus Law.
3. Explain the phenomena of double refraction.
4. Explain what is meant by half wave plate.
5. Explain what is meant by Quarter wave plate
6. Write a short note on LCD's

CHAPTER –IV **ABERRATIONS**

LONG ANSWER TYPE QUESTIONS (7 MARKS)

1. What is Chromatic Aberration? Obtain an expression for the Chromatic Aberration of a lens.
2. What is Chromatic Aberration? Derive the condition for achromatism when two lenses are in contact and separated by a distance.
3. What is spherical aberration in a lens? Discuss various methods to minimize it.
4. What is spherical aberration in a lens? Explain how the spherical aberration can be minimized when two thin lenses separated by a distance. Obtain condition for it.
5. Discuss different types of optical fibres.
6. Discuss the Modes (i) Step index (ii) Graded index Fibres and their structures.
7. Describe the how the optical fibre is used for communication and explain its advantages

SHORT ANSWER TYPE QUESTIONS (3 MARKS)

1. What is the phenomenon on which the optical works?
2. Give the principle of fibre communication.
3. Explain the principle and working of optical fibre.
4. Give the applications of fibre optics.
5. What is coma? How it can be minimized?
6. What is Astigmatism? What are the conditions for astigmatism?
7. Explain curvature and distortion?

CHAPTER –V **LASERS AND HOLOGRAPHY**

LONG ANSWER TYPE QUESTIONS (7 MARKS)

1. Define Einstein Coefficients. And obtain the relation between them.
2. Describe the construction and working of Ruby Laser.
3. Describe the construction and working of Helium- Neon Laser.

4. Explain the basic of Holography and discuss the applications of holography.

SHORT ANSWER TYPE QUESTIONS (3 MARKS)

1. What are the applications of Lasers?
2. Define Spontaneous and stimulated emission.
3. Distinguish between Spontaneous and stimulated emission.
4. What is holography?
5. Explain population Inversion and metastable state.

Model Papers

Equipartition Theorem:	It is part of introduction to kinetic theory of gases.
Degrees of freedom:	It is part of introduction to kinetic theory of gases.
Introduction to any four heat engines:.	To understand working and efficiencies of several of heat engines
Thermodynamic scale of temperature:	Which is having any link with present topics?
Joule-Kelvin effect:	This topic will also study in low temperature physics
Kapitza method:	
Joule Expansion:	It is presented as a part of difference between Joule expansion and adiabatic expansion
Linde's method:	

CO-PO Mapping:

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	3	3	1	2	2	3	2	3	2	3	3	2
CO2	3	2	3	3	2	3	3	1	3	3	3	2	1	2	2	3
CO3	2	3	2	3	2	3	2	2	2	3	2	2	3	2	1	3
CO4	3	2	3	2	2	2	3	3	1	1	3	1	2	3	2	2
CO5	3	2	3	2	2	2	3	3	1	1	3	1	2	3	3	1

Question Bank:

UNIT-I

1. Describe the Toothed wheel experiment for verification of Maxwell's law of distribution of molecular velocities
2. Define Mean free path
3. What is thermal conductivity? Derive an expression for coefficient of thermal conductivity.
4. Define Viscosity of gases? Derive an expression for coefficient of viscosity of gases.
5. What do mean by Diffusion of gases? Derive an expression for coefficient of Diffusion of gases.
6. State the postulates of kinetic theory of gases
7. Explain about the Transport phenomena in ideal gases
8. How do you determine the C_{rms} velocity

UNIT-II

1. Differentiate between Isothermal and Adiabatic processes.
2. What is heat engine? Determine the efficiency of a Carnot heat engine.
3. Explain briefly about Reversible and irreversible processes.
4. Discuss about the second law of Thermodynamics.
5. Explain about the change in entropy in reversible and irreversible processes.
6. What is Entropy? Explain its physical significance.
7. Discuss about principle of refrigeration.
8. What is T-S diagram and mention its uses

UNIT-III

1. Explain briefly about Thermo dynamical potentials and its significance
2. Derive of Maxwell's thermodynamic relations from thermodynamic potentials
3. Derive the difference and ratio between C_p and C_v
4. Determine the expression for Clausius-Clayperon's equation

UNIT-IV

1. Explain about Joule Kelvin effect- Porous plug experiment
2. Describe an expression for Joule-Thomson cooling
3. Distinguish between Adiabatic and Joule-Thomson expansion
4. Discuss about the liquefaction of Helium by Kapitza's method
5. Interpret the phenomenon of Production of low temperatures by adiabatic demagnetization
6. Write down the practical applications of substances at low temperatures

UNIT-V

1. What is Black body radiation? Give examples
2. Explain about spectral energy distribution of black body radiation
3. Give definitions for (i) Kirchoff's law (ii) Wein's displacement law (iii) Stefan-Boltzmann's law and (iv) Rayleigh-Jean's law
4. Derive Planck's law of black body radiation
5. Deduction of Wein's law and Rayleigh- Jean's law from Planck's law
6. Define Solar constant and determine it using Angstrom pyroheliometer
7. How do estimate the surface temperature of Sun

GOVERNMENT COLLEGE (A): RAJAMAHENDRAVARAM
DEPARTMENT OF PHYSICS
MODEL PAPER FOR III - SEMESTER END EXAMINATION
MODULE - III: THERMODYNAMICS

(As Approved in the BOS meeting held on 02 AUG 22 for batch 2022-2023)

Time: 2 Hr. 30 Min.

Max. Marks: 50

SECTION - A

Answer ALL the Questions

(5x7=35)

On the basis of kinetic theory of gases, derive expression for Coefficient of viscosity.

[OR]

Describe the Toothed wheel experiment for verification of Maxwell's law of distribution of molecular velocities

- ❖ Electricity and Magnetism, R.Murugeshan, S. Chand &Co.
- ❖ Principles of Electronics, V.K. Mehta, S.Chand&Co.,
- ❖ Digital Principles and Applications, A.P. Malvino and D.P.Leach, McGrawHilledition.

WebLinks:

1. <https://ocw.mit.edu/courses/physics/8-02-physics-ii-electricity-and-magnetism-spring-2007>
2. <http://physics.bu.edu/~duffy/classroom.html>
3. <https://nptel.ac.in/courses/115/106/115106122/>

Deletion	Addition
Potential due to a dipole: Students have studied in lower classes.	Differential form of Gauss law: Differential form of Gauss law is useful to study Maxwells electromagnetic equations.
Dielectric strength:	Applications of dielectrics: To understand the practical usage of dielectrics
	Transformer: To make students to understand the application of mutual induction.

Additional Inputs: Power sources

CO-PO Mapping:

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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CO3	2	3	2	3	2	3	2	2	2	3	2	2	3	3	1	2
CO4	3	2	3	2	2	2	3	3	1	1	3	1	2	2	2	1
CO5	3	2	3	2	2	2	3	3	1	1	3	1	2	1	3	2

Question Bank:

UNIT-I

1. State the Gauss law in electrostatics and prove it.
2. Derive the electric field intensity due to uniformly charged solid sphere.
3. Obtain expression electric field intensity due to an infinite conducting sheet of charge.
4. Deduce the Coulomb's law from Gauss law
5. Derive the potential due to a uniformly charged sphere
6. Discuss about the equipotential surfaces.
7. Explain about the Polar and Non-polar dielectrics
8. Derive an expression for capacitance of a parallel plate condenser with dielectric slab between the plates.
9. Define Electric displacement vector(D), electric polarization (P) and Electric field intensity vector (E). Obtain the relation between D, E and P.
10. Discuss about the Dielectric constant and electric susceptibility.

UNIT-II

1. What is Biot-Savart's law? Derive its expression.
2. Derive an expression for magnetic field due to circular loop.
3. Obtain an expression for magnetic field due solenoid.
4. Discuss about the Divergence and curl of magnetic field.
5. What is Ampere's Circuital Law and discuss its application to Solenoid.
6. What is Hall Effect and determine its Hall coefficient?
7. Discuss about the applications of Hall Effect.
8. State and explain Faraday's Laws in electromagnetic induction? Derive an expression for the self-inductance of a long solenoid.
9. Explain briefly about mutual induction two coils.
10. Derive an expression for energy stored in magnetic field.
11. Explain about the principle and working of transformer.
12. Discuss about eddy currents and electromagnetic damping.

UNIT-III

1. What is alternative current (A.C)? Obtain expression of the average value and virtual value of A.C.
2. Describe the behavior of LCR series circuit when an alternating current passing through it? Explain the condition of resonance.
3. Derive the equation of electromagnetic wave and hence determine the velocity of propagation of electromagnetic wave in free space.
4. Derive an expression for impedance of a series LCR circuit for A.C signals.
5. Discuss the condition under which resonance occurs in series circuit and obtain an expression for resonant frequency.
6. Discuss the growth and decay of current in L-R circuit.
7. Explain Q-factor and power factor.
8. What is displacement current? How Maxwell modified Ampere's circuital law by displacement current.
9. Derive four Maxwell's equations.
10. Obtain an expression for Maxwell's electromagnetic waves equations.
11. State and prove the Poynting theorem.
12. Discuss the transverse nature of electromagnetic waves.

UNIT-IV

1. Define α , β and γ of a Transistor? Derive the relation between them?
2. What is a Transistor? Explain how it works and explain the CE characteristics of a Transistor?
3. Draw the I-V characteristics of a P-N junction diode and explain it?
4. Draw the I-V characteristics of a Zener diode and explain it?
5. In a Transistor, base current and emitter current are 0.08mA and 9.6mA respectively. Calculate collector current, α and β ?
6. Explain about the Light Emitting Diode.
7. Explain that how Zener diode is acts voltage regulator.
8. Discuss about CE, CB and CC transistors.

9. Discuss about hybrid parameters.
10. Discuss that how transistor can be acts as anamplifier.

UNIT-V

1. State and Prove De Morgan's Theorems? Explain how NAND gate can be used as a universal gate?
2. Discuss the working of half - adder and Full- adder and give their truth-tables
3. Convert $(0.1100101)_2$ to decimal number?
4. Explain NAND and NOR gates using their truth tables.
5. Discuss about binary addition and subtraction.
6. Discuss about basic logic gates.
7. What are universal gates and discuss those gates with examples.
8. Discuss about Exclusive-OR gate.

GOVERNMENT COLLEGE (A): RAJAMAHENDRAVARAM

DEPARTMENT OF PHYSICS

MODEL PAPER FOR IV - SEMESTER END EXAMINATION

MODULE - IV: Electricity, Magnetism and Electronics

(As Approved in the BOS meeting held on 02 Aug 2022 for batch 2022-2023)

Time: 2 Hr. 30 Min.

Max. Marks: 50

SECTION - A

Answer ALL Questions $5 \times 7 = 35$

1. State Gauss Law In Electrostatics and Derive It's Differential Form

or

Explain the boundary conditions at the dielectric surface.

2. State Hall Effect? Describe the Hal effect setup and determine the Hall coefficient of the given material

Question Bank:

UNIT-I

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? Explain the formation of Stoke's and Anti Stoke's lines on the basis of quantum theory.
4. Explain L – S Coupling Scheme.
5. Explain j – j Coupling Scheme.
6. Mention any four applications of Raman Effect.
7. The Exciting line in an experiment is 5460\AA and stokes line is at 5520\AA . Find the wave length of anti – stokes line.
8. A sample was excited by 4358\AA line. A Raman line was observed at 4447\AA . Calculate the Raman shift.
9. What is Zeeman Effect?

UNIT-II

1. Describe the Davisson and Germer experiment to demonstrate the wave character of electrons.
2. What are matter waves? Derive an expression for de-Broglie wavelength of matter waves.
3. State and Explain Heisenberg's uncertainty principle for position and momentum. Extend it to Energy and Time.
4. Write the properties of matter waves.
5. Explain de – Broglie hypothesis of matter waves.
6. Calculate the de-Broglie wavelength associated with a proton moving with a velocity equal to $1/20^{\text{th}}$ of the velocity of light. (Mass of the proton is $1.67 \times 10^{-27}\text{kg}$)
7. If the uncertainty in the momentum of an electron is $1.65 \times 10^{-24}\text{ kg m/sec}$. calculate the uncertainty in its position.
8. What are matter waves?
9. Illustrate the uncertainty principle using diffraction of beam of electrons (Diffraction by a single slit).
10. Discuss about Bohr's principle of complementarity.

UNIT – III

1. Derive Schrodinger time dependent wave equation.
2. Derive Schrodinger time independent wave equation.
3. Obtain an expression for the energy of particle in one dimensional potential well of infinite height.
4. Mention the basic postulates of quantum mechanics.
5. Explain the physical interpretation of wave function.
6. Find the least energy of an electron moving in the dimension in an infinitely high potential box of width 1\AA . Given mass of the electron $9.11 \times 10^{-31}\text{ kg}$ and $h = 6.63 \times 10^{-34}\text{ J-s}$
7. What is meant by Eigen functions and Eigen values?

UNIT –IV

1. Explain liquid drop model in detail. Write its drawbacks.
2. Explain shell model of nucleus. Mention its merits and demerits.

3. Explain Gamow's theory of α -decay
4. Explain any four basic properties of nuclei.
5. Discuss about the Yukawa's meson theory
6. Explain neutrino hypothesis
7. A nucleus of mass number 125 has radius 6 Fermi. Find the radius of a nucleus having massnumber 64.
8. Define binding energy and explain with examples.
9. What are magic numbers?
10. Discuss about G.M. Counter and Cloud chamber for nuclear radiation detection.

UNIT-V

1. Define nano materials. Discuss about electron confinement, size effect and surface to volume ratio.
2. Discuss about various types of nanomaterials.
3. Explain about carbon nano tubes and Graphene.
4. Discuss about the properties of nanomaterials.
5. Explain about the vital applications of nanomaterials
6. Explain Type-I and Type-II superconductors?
7. Explain the Meissner effect.
8. Mention the applications of superconductors
9. Discuss about BCS theory.
10. Define critical temperature, critical magnetic field and isotope effect.

CO-PO Mapping:

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

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CO2	3	2	3	3	2	3	3	1	3	3	3	2	1	1	2	1
CO3	2	3	2	3	2	3	2	2	2	3	2	2	3	3	2	2
CO4	3	2	3	2	2	2	3	3	1	1	3	1	2	2	1	1

Question Bank:

UNIT-I

1. Discuss about the construction and normal adjustment of Simple microscope
2. Describe the construction and working of a Travelling microscope
3. Define Microscope
4. What are the uses of microscope
5. State the operating principle of a Phase contrast microscope
6. Write about different types of microscopes
7. Explain about the need of microscope
8. How do you determine magnifying power of a Compound microscope

UNIT-II

1. Differentiate between Astronomical telescope and Terrestrial telescope
2. Explain briefly about Refracting and Reflecting telescopes
3. How do you determine the magnifying power of an Astronomical telescope
4. What are the uses of a Telescope
5. Write about working principle and applications of Binoculars
6. Discuss about various types of Telescopes

UNIT-III

1. Explain briefly about Optical microscopes like Compound microscope, Stereo microscope, Confocal microscope
2. Write about the applications of various microscopes
3. Give explanation for Scanning Probe Microscope
4. Write short notes on ideas and applications of Telescopes
5. Discuss about Electron microscopes like TEM and SEM
6. Distinguish between Microscopes and Telescopes
7. Describe (i) Optical telescopes (ii) Radio telescopes (iii) X-ray telescope

UNIT-IV

1. Explain about how an Eye act as an optical instrument
2. Write about optical vision
3. Define ophthalmic lenses. Give explanation for Removal of defects in vision using ophthalmic lenses
4. Write short notes on Far points and near points
5. Discuss about Myopia and Hypermetropia defects
6. Distinguish between ophthalmic lenses and contact lenses
7. Interpret the phenomenon of Formation of image in the eye and the camera
8. Describe the Working principle of contact lenses

UNIT-V

1. Write about Ophthalmoscope
2. Explain about keratometer and their working principle
3. Give explanation for checking the power of lenses
4. Write short notes on Evaluation of eye disorders
5. Discuss about Evaluation of eye disorders
6. Interpret the Principles of Computer based eye testing

Question Bank:

UNIT-I

1. Discuss about Image formation in simple camera and human eye
2. Describe the Working principle of a camera
3. Define Photography
4. What are the factors influencing choice of camera
5. Write about Care and maintenance of camera
6. Explain about Digital cameras and Drone flying cameras
7. Differentiate between Single Lens Reflex (SLR) camera, Twin Lens Reflex (TLR) camera

UNIT-II

1. Discuss about different types of Digital cameras and their parts
2. Explain about the working of DSLR camera
3. How do you determine Depth of focus, Depth of field
4. Explain about the knowledge on pixels and their uses
5. Write briefly about normal, wide angle and zoom lenses
6. Discuss about Digital Image formation, Aperture, Shutter speed, ISO and filters

UNIT-III

1. Explain the need for the light in photography
2. Write short notes on Artificial light sources like Flood light, Spot light, Halogen light, Halogen flash light, Digital lights
3. Discuss about Studio photography
4. Interpret the phenomenon of exposure
5. Describe about Light sources like Natural light, Sun light, Moon light, Ambient light

UNIT-IV

1. Discuss about Techniques of Photomicrography
2. Describe the significance and role of Camera lens in photo shooting
3. Explain about Techniques involved in the use of DSLR cameras
4. What are uses of filters
5. Write about Medical Photography and Astronomical Photography
6. Explain High speed Photography with motor driven camera and Basic ideas on Underwater Photography
7. Write about Forensic Photography

UNIT-V

1. Discuss about developing and printing the photographs
2. Describe the equipment and materials used in developing and printing, image mixing and printing

3. Explain briefly how the Image editing through image editing software's like Adobe Photoshop
4. What is adjustment of Brightness, Contrast
5. What are the factors influencing quality of digital image
6. Explain the methods of storing and processing of image

GOVERNMENT COLLEGE (A), RAJAHMUNDRY
IIIB.Sc Physics – V SEM
7A: OPTICAL INSTRUMENTS AND OPTOMETRY
MODEL PAPER

Time: 2 ½ hrs

Max. Marks:50M

SECTION A

Answer ALL Questions (each questions carries 7 marks)

5X7 =35M

- 1 a) Discuss about Image formation in simple camera and human eye.

OR

- b) Differentiate between Single Lens Reflex (SLR) cameras, Twin Lens Reflex (TLR) camera.

- 2 a) Explain about Digital cameras and Drone flying cameras

OR

- b) Explain about the working of DSLR camera.

- 3 a) Explain about the knowledge on pixels and their uses

OR

- b) Write short notes on Artificial light sources like Flood light, Spot light, Halogen light, Halogen flash light, Digital lights

- 4 a) Write about Medical Photography and Astronomical Photography

OR

- b) Explain about Techniques involved in the use of DSLR cameras.

- 5 a) Explain briefly how the Image editing through image editing software's like Adobe Photoshop.

OR

- b) Explain the methods of storing and processing of image.

SECTION B

Answer any FIVE Questions (each question carries 3 marks)

5X3 =15

- 6 Differentiate between Single Lens Reflex (SLR) camera, Twin Lens Reflex (TLR) camera.
- 7 Discuss about Digital Image formation, Aperture, Shutter speed, ISO and filters.
- 8 Explain the need for the light in photography.
- 9 Discuss about Techniques of Photomicrography.
- 10 Discuss about developing and printing the photographs.
- 11 What is adjustment of Brightness, Contrast.
- 12 Explain about Digital cameras and Drone flying cameras.
- 13 Write about Medical Photography and Astronomical Photography

Web links:

1. The Physics Hyper Text Book. Refrigerators. <https://physics.info/refrigerators/>
2. https://trc.nist.gov/cryogenics/Papers/Review/2017-Low_Temperature_Applications_and_Challenges.pdf
3. <https://nptel.ac.in/content/storage2/courses/112105129/pdf/RAC%20Lecture%203.pdf>
4. Other Web sources suggested by the teacher concerned and the reading material. <https://nptel.ac.in>
- 5.

CO-PO Mapping:

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CO2	3	2	3	3	2	3	3	1	3	3	3	2	1	2	1	2
CO3	2	3	2	3	2	3	2	2	2	3	2	2	3	1	2	1
CO4	3	2	3	2	2	2	3	3	1	1	3	1	2	1	2	3

Question Bank

UNIT-I

1. Define and Discuss about Regenerative cooling
2. Describe the Joule-Thomson effect
3. What are the Freezing mixtures
4. Write Properties of materials at low temperatures
5. Explain Adiabatic demagnetization
6. Describe about production of liquid hydrogen and nitrogen
7. Discuss about different methods of liquefaction of gases and explain about liquefaction of air

UNIT-II

1. Explain Gas thermometer and its correction and calibration
2. Differentiate between thermometers and thermocouples
3. Discuss about Resistance thermometers, Vapour pressure thermometers and Magnetic thermometers
4. Write about Advantages and drawbacks of each type of thermometer
5. Discuss about thermocouples

UNIT-III

1. What is Refrigeration? Mention the types of Refrigeration
2. Discuss about the Stages of refrigeration
3. Draw the block diagram and explain Refrigeration cycle
4. Distinguish between Natural and artificial refrigeration
5. Explain Vapour compression and vapour absorption refrigeration systems,
6. What is Ideal refrigerant? What are commonly used refrigerants

7. Write the role of Refrigerants in air conditioners
8. Interpret the phenomenon of Eco-friendly refrigerants
9. What are the properties of refrigerant

UNIT-IV

1. Discuss about Refrigerator and its working with Block diagram
2. Describe the types of compressors, evaporators and condensers and their functional aspects
3. Explain defrosting in a refrigerator
4. Define Coefficient of Performance (COP), Tons of refrigeration (TR) and Energy Efficiency Ratio (EER)
5. Explain Refrigerant leakage and detection

UNIT-V

1. What are the applications of Low temperatures
2. Discuss about Preservation of biological material
3. Describe the role of liquid nitrogen and liquid hydrogen in medical field
4. What is Food freezing
5. Explain Tissue ablation (cryosurgery) and Cryogenic rocket propulsion system
6. Explain about the various applications of Refrigeration

Question Bank:

UNIT-I

1. Explain about Spectral distribution of solar radiation
2. Describe the working principle of Pyroheliometer
3. Explain the working Principle of Pyrometer
4. Define and explain Solar constant
5. What is zenith angle and Air-Mass
6. State and explain standard time
7. Write short note on equation of time

UNIT-II

1. What are the Solar Thermal Collectors and explain Flat plate collector
2. Write a short notes on Solar cookers, Solar dryers, Solar desalinators
3. Describe about Concentrating collectors
4. Define collector efficiency factor, collector heat-removal factor and collector flow factor
5. Explain about Evacuated tube collector

UNIT-III

1. Define and explain Schottky barrier
2. What are the advantages and drawbacks of solar cells
3. Draw and explain I-V characteristics of a Solar cell
4. Define series and shunt resistance? Give explanation about their effect on efficiency
5. Write short notes on Photovoltaic cell
6. Discuss about conversion efficiency and quantum efficiency

UNIT-IV

1. What are different types of solar cells
2. Discuss about I-V characteristics of Crystalline silicon solar cells
3. Describe the structure and configurations of thin film solar cells - CdTe/CdS
4. What are the advantages and limitations of solar cells
5. Describe briefly about the various steps involved in Module fabrication
6. Write about Modules in series and parallel
7. Explain Double and triple junction cells

UNIT-V

1. Discuss about Energy storage modes
2. Describe the Energy storage in PV systems

3. Write about Mechanical storage – Flywheel
4. Write about Electrical storage – Super capacitor
5. Explain briefly about Solid-state battery, Molten solvent battery, lead acid battery and dry batteries

GOVERNMENT COLLEGE (A), RAJAHMUNDRY

III B.Sc Physics – V SEM

7B: Solar Energy and Applications

MODEL PAPER

Time: 2 ½ hrs

Max. Marks :50M

SECTION A

Answer ALL Questions (each questions carries 7 marks)

5X7 =35M

- 1 a) Describe the working principle of Pyroheliometer.

OR

- b) Explain about Spectral distribution of solar radiation.

- 2 a) Write a short notes on Solar cookers, Solar dryers, Solar desalinators.

OR

- b) Explain about Evacuated tube collector.

- 3 a) What are the advantages and drawbacks of solar cells.

OR

- b) Define series and shunt resistance? Give explanation about their effect on efficiency.

- 4 a) Discuss about I-V characteristics of Crystalline silicon solar cells

OR

- b) Discuss about I-V characteristics of Crystalline silicon solar cells.

- 5 a) Describe the Energy storage in PV systems

OR

- b) Write about Mechanical storage – Fly wheel.

SECTION B

Answer any FIVE Questions (each question carries 3 marks)

5X3 =15

- 6 Define and explain Solar constant.

- 7 Write a short notes on Solar cookers, Solar dryers, Solar desalinators.

- 8 Write short notes on Photovoltaic cell.

- 9 Explain Double and triple junction cells.

- 10 Describe the Energy storage in PV systems.

Question Bank:

UNIT-I

1. What are Passive and Active elements
2. Define the terms Resistor, Capacitor and Inductor
3. Discuss about Applications of a Resistor as a heating element in heaters and as a fuse element
4. Describe the Applications of Capacitor in power supplies, motors
5. Define and explain Energy stored in a capacitor
6. Write about Series resonance circuit as a Radio tuning circuit
7. Explain Application of choke in a fan and in a radio tuning circuit

UNIT-II

1. What are the differences between AC and DC
2. Describe different types of AC & DC sources
3. Explain briefly about Rechargeable batteries i.e Lead acid batteries, Ni-MH batteries, Li-ion batteries- Li-PO batteries
4. Describe Series, Parallel & Series-Parallel configuration of batteries
5. Discuss about Constant Voltage source-Constant Current Source
6. What are the applications of Current sources & Voltage sources
7. Discuss about SMPS used in computers

UNIT-III

1. Draw and explain the working principle of a transformer
2. Describe construction and working principle of a Generator,
3. Distinguish between Step-up and Step-down transformers
4. Define emf? Explain relation between primary turns and secondary turns of the transformer
5. What is the use of a transformer in a regulated power supplies
6. Discuss about working principle of single phase motor
7. Write the Applications of motors

UNIT-IV

1. Discuss about working of a DC regulated power supply
2. Describe the construction of a 5 volts regulated power supply
3. Define FM? Describe simple design of FM Radio circuit using LCR series resonance (tuning) circuit
4. Explain about the design of a simple 5 volts DC charger
5. Write a short note on power supply for computers (SMPS)
6. Explain the design of a step-down (ex: 220-12V) transformer

7. How do you checking the output voltage of a battery eliminator using a Multi Meter (Trouble shooting)

UNIT-V

1. Discuss about
2. Describe the construction and operating principle of a DC motor
3. Define the terms (i) calculation of power (ii) voltage and (iii) current in a DC motor
4. Explain briefly about the design of a simple Motor (Fan) with suitable turns of coil
5. Explain the construction, operating principle and EMF equation of a DC generator
6. Write the differences between DC and AC generators

GOVERNMENT COLLEGE (A), RAJAHMUNDRY
IIIB.Sc Physics – V SEM
6C: APPLICATIONS OF ELECTRICITY & ELECTRONICS
MODEL PAPER

Time: 2 ½ hrs

Max. Marks:50M

SECTION A

Answer ALL Questions (each questions carries 7 marks)

5X7 =35M

- 1 a) Describe the Applications of Capacitor in power supplies, motors.

OR

- b) Explain Application of choke in a fan and in a radio tuning circuit.
2 a) Explain briefly about Rechargeable batteries i.e Lead acid batteries, Ni-MH batteries, Li-ion batteries- Li-PO batteries

OR

- b) Discuss about Constant Voltage source-Constant Current Source.
3 a) Describe construction and working principle of a Generator

OR

- b) Define emf? Explain relation between primary turns and secondary turns of the transformer.
4 a) Discuss about working principle of single phase motor.

OR

- b) Explain about the design of a simple 5 volts DC charger.
5 a) Explain briefly about the design of a simple Motor (Fan) with suitable turns of coil.

OR

- b) Explain briefly about the design of a simple Motor (Fan) with suitable turns of coil.

SECTION B

Answer any FIVE Questions (each question carries 3 marks)

5X3 =15

- 6 What are Passive and Active elements?
- 7 Describe different types of AC & DC sources.
- 8 Distinguish between Step-up and Step-down transformers.
- 9 How do you checking the output voltage of a battery eliminator using a Multi Meter (Trouble shooting)
- 10 Discuss about working of a DC regulated power supply.
- 11 Write a short note on power supply for computers (SMPS).
- 12 Explain briefly about the design of a simple Motor (Fan) with suitable turns of coil.

Question Bank

UNIT-I

1. Discuss about construction and working of an Analog Multimeter with a Block diagram
2. Describe the construction and working of a Digital Multimeter with Block diagram
3. Define Voltmeter
4. What is sensitivity and how do you determine the sensitivity of an instrument
5. Differentiate between DC Voltmeter and AC Voltmeter
6. Explain about basic ideas on Function generator
7. Write a note on Analog instruments & Digital Instruments

UNIT-II

1. Draw the block diagram and explain the parts of a CRO
2. Write down the use of CRO for the measurement of voltage
3. Explain different types of oscilloscopes and their uses
4. How do you determine (i) frequency and (ii) phase difference in CRO
5. Discuss about Digital Storage Oscilloscope
6. Discuss about various functions of a CRO

UNIT-III

1. Explain about Resistive and capacitive touch screen transducer used in mobiles
2. Interpret the Selection of transducers
3. What is a transducer? classify them
5. Write short notes on fibre optic sensors
6. Discuss about Piezoelectric transducer
7. Distinguish between Photo transducer, Digital transducer

UNIT-IV

1. What are display devices? Write down the types of display devices
2. Discuss about construction and operation LED displays
3. Describe the construction and operation of seven segment displays

4. What is SSD? Mention the limitations of SSDs
5. Write about Liquid Crystal Displays and applications of LCD modules
6. Explain principle and working of 2x16 display and 4x16 LCD modules

UNIT-V

1. Discuss about basic operating principle and use of (i) Clinical thermometer (ii) Stethoscope
2. Describe the basic ideas of CT scan and MRI scan
3. Discuss about operating principle and use of Radiography
4. Explain about Ultrasound scanning and its uses
5. Explain the terms (i) Ventilator (ii) Pulse oxymeter (iii) Glucometer
6. How do you get the functioning of heart using ECG machine

GOVERNMENT COLLEGE(A), RAJAHMUNDRY
III B.Sc Physics – V SEM
7C: ELECTRONIC INSTRUMENTATION
MODEL PAPER

Time: 2 ½ hrs

Max. Marks :50M

SECTION A

Answer ALL Questions (each questions carries 7 marks)

5X7 =35M

1. a) Describe the construction and working of a Digital Multimeter with Block diagram

OR

 b) Discuss about construction and working of an Analog Multimeter with a Block diagram
- 2 a) Draw the block diagram and explain the parts of a CRO and Write down the use of CRO for the measurement of voltage

OR

 b) Explain different types of oscilloscopes and their uses
- 3 a) Describe construction and working principle of a Generator

OR

 b) Define emf? Explain relation between primary turns and secondary turns of the transformer.
- 4 a) What are display devices? Describe the construction and operation of seven segment displays

OR

 b) Explain principle and working of 2x16 display and 4x16 LCD modules.
- 5 a) Discuss about basic operating principle and use of (i) Clinical thermometer (ii) Stethoscope

OR

 b) How do you get the functioning of heart using ECG machine

SECTION B

Answer any FIVE Questions (each question carries 3 marks)

5X3 =15

- 6 Differentiate between DC Voltmeter and AC Voltmeter
- 7 What is SSD? Mention the limitations of SSDs
- 8 What is sensitivity and how do you determine the sensitivity of an instrument
9. Interpret the Selection of transducers