Paper V: Electricity, Magnetism& Electronics

(For Maths Combinations)

V SEMESTER

Work load: 60 hrs per semester **4 hrs/week**

UNIT-I (12 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)charged spherical shell and uniformly charged sphere.

2. Dielectrics:

Electric dipolemoment and molecular polarizability- Electric displacement D, electric polarization P – relation between D, E and P- Dielectric constant and susceptibility. Boundary conditions at the dielectric surface.

UNIT-II (12 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.

4. Electromagnetic induction

Faraday's law-Lenz's law- Self and mutual inductance, coefficient of coupling, calculation of self inductance of a long solenoid, energy stored in magnetic field.Transformer - energy losses - efficiency.

UNIT-III (12 hrs)

5. Alternating currents and electromagnetic waves

Alternating current - Relation between current and voltage in LR and CR circuits,vector diagrams, LCR series and parallel resonant circuit, Q –factor, power in ac circuits.

6. Maxwell's equations

Idea of displacement current - Maxwell's equations (integral and differential forms) (no derivation), Maxwell's wave equation (with derivation), Transverse nature of electromagnetic waves.Poynting theorem (statement and proof), production of electromagnetic waves (Hertz experiment).

UNIT-IV (12 hrs)

7. Basic electronics:

PN juction diode, Zener diode, Tunnel diode, I-V characteristics, PNP and NPN transistors, CB, CE and CC configurations – Relation betweenα, β and γ - transistor (CE) characteristics -Determination of hybrid parameters, Transistor as an amplifier.

UNIT-V: (12 hrs)

8. Digital electronics

Number systems - Conversion of binary to decimal system and vice versa.Binary addition and subtraction (1's and 2's complement methods).Laws of Boolean algebra - De Morgan's laws-statement and proof, Basic logic gates, NAND and NOR as universal gates, exclusive-OR gate, Half adder and Full adder, Parallel adder circuits.

REFERENCE BOOKS

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

Practical Paper V:Electricity, Magnetism & Electronics

Work load: 30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. Figure of merit of a moving coil galvonometer.
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.
6. PN Junction Diode Characteristics
7. Zener Diode Characteristics
8. Transistor CE Characteristics- Determination of hybrid parameters
9. Logic Gates- OR,AND,NOT and NAND gates. Verification of Truth Tables.
10. Verification of De Morgan's Theorems.

Suggested student activities
Student seminars, group discussions, assignments, field trips, study project and experimentation using virtual lab

Examples
Seminars - A topic from any of the Units is given to the student and asked to give a brief seminar presentation.
Group discussion - A topic from one of the units is given to a group of students and asked to discuss and debate on it.
Assignment - Few problems may be given to the students from the different units and asked them to solve.
Field trip - Visit to Satish Dhawan Space Centre, Sriharikota / Thermal and hydroelectric power stations / Science Centres, any other such visit etc.
Study project - Web based study of different satellites and applications.

Domain skills:
Logical derivation, experimentation, problem solving, data collection and analysis, measurement skills

***** Documental evidence is to be maintained for the above activities.**

Paper VI: Modern Physics

(For Maths Combinations)

V SEMESTER

Work load: 60 hrs per semester **4 hrs/week**

UNIT-I (12 hrs)

1. Atomic and molecular physics

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

Raman effect, hypothesis, Stokes and Anti Stokes lines. Quantum theory of Raman effect. Experimental arrangement – Applications of Raman effect.

UNIT-II (12 hrs)

2. 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 - Complementarity principle of Bohr.

UNIT-III (12 hrs)

3. 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-IV(12 hrs)

4. General Properties of Nuclei

Basic ideas of nucleus -size, mass, charge density (matter energy), binding energy, angular momentum, parity, magnetic moment, electric moments. Liquid drop model and Shell model (qualitative aspects only) - Magic numbers.

5. Radioactivity decay:

Alpha decay: basics of α-decay processes. Theory of α-decay, Gamow's theory, Geiger Nuttal law.β-decay, Energy kinematics for β-decay, positron emission, electron capture, neutrino hypothesis.

UNIT-V (12 hrs)

6. Crystal Structure

Amorphous and crystalline materials, unit cell, Miller indices, reciprocal lattice, types of lattices, diffraction of X-rays by crystals, Bragg's law, experimental techniques, Laue's method and powder diffraction method.

7. Superconductivity:

Introduction - experimental facts, critical temperature - critical 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 Akademy, Hyderabad
2. Molecular Structure and Spectroscopy by G. Aruldhas. Prentice Hall of India, New Delhi.
3. Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath. S. Chand & Co.
4. Modern Physics by G. Aruldhas & P. Rajagopal. Eastern Economy Edition.
5. Concepts of Modern Physics by Arthur Beiser. Tata McGraw-Hill Edition.
6. Quantum Mechanics, Mahesh C Jain, Eastern Economy Edition.
7. Nuclear Physics, Irving Kaplan, Narosa publishing House.
8. Nuclear Physics, D.C.Tayal, Himalaya Publishing House.
9. Elements of Solid State Physics, J.P.Srivastava, Prentice Hall of India Pvt., Ltd.
10. Solid State Physics, A.J. Dekker, McMillan India.

Practical Paper VI:Modern Physics

Work load: 30 hrs **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 β-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.

Note: For all the above 8 practical papers the book "B.Sc Practical Physics" by C.L. Arora Published by S.Chand & Co, New – Delhi may be followed.

NOTE: Problems should be solved at the end of every chapter of all units.

Suggested student activities

Student seminars, group discussions, assignments, field trips, study project and experimentation using virtual lab

Examples

Seminars - A topic from any of the Units is given to the student and asked to give a brief seminar presentation.

Group discussion - A topic from one of the units is given to a group of students and asked to discuss and debate on it.

Assignment - Few problems may be given to the students from the different units and asked them to solve.

Field trip - Visit to Satish Dhawan Space Centre, Sriharikota / Thermal and hydroelectric power stations / Science Centres, any other such visit etc.

Study project - Web based study of different satellites and applications.

Domain skills:

Logical derivation, experimentation, problem solving, data collection and analysis, measurement skills

***** Documental evidence is to be maintained for the above activities.**

Paper V : Electricity, Magnetism& Electronics

(For Non-Maths Combinations)

V SEMESTER

Work load: 60 hrs per semester **4 hrs/week**

UNIT-1(15 hrs)

1. Electric field and potential

Coulomb's law – electric field and intensity of electric field –intensity of electric field due to i) a point charge–electric dipole and dipole moment. Electric lines of force, Electric flux.Gauss's law statement and its proof- applications of Gauss Law to (1) Uniformly charged sphere (2) an infinite conducting sheet of charge (No Derivation- qualitative ideas only). Electrical potential – equi-potential surfaces- potential due to i) a point charge, ii)charged spherical shell.Equi-potential surfaces with examples.

UNIT-II(10 hrs)

2. Capacitance and dielectrics

Derivation of expression for capacity due to i) a parallel plate capacitor with and without dielectric, ii) a spherical capacitor. Energy stored in a capacitor, electric capacitance. Electric dipole moment Di-electrics with examples, effect of electric field-electric displacement D, electric polarization P, permeability &susceptibility (Definitions only) – relation between D,E and P.Dipolemoment of heart.

UNIT-III (10 hrs)

3. Current electricity

Current and current density, drift velocity expression, Kirchhoff's laws –statement and explanation and application to Wheatstone bridge, sensitivity of Wheatstone bridge, Carey-Foster's bridge- experimentalmeasurement of temperature coefficient of resistance- strain gauge-piezoelectric transducers (applications only)

UNIT-IV (15 hrs)

5. Electromagnetism

Magnetic induction B, magnetic flux – Biot –Savart's law, magnetic induction due to (i) a long straight conductor carrying current (ii) on the axis of a circular coil carrying current (iii) solenoid, (No derivation-qualitative treatment only) Ampere's law – derivation of expression for the force on (i) charged particles and (ii) current carrying conductor in the magnetic field, Hall effect and its importance-electromagnetic pumping.

Faraday's law of electromagnetic induction, Lenz's law - Construction, theory and working of a Moving Coil Ballistic Galvanometer,application of B.G. damping correction, Self induction, Mutual induction and their units- Electromagnetic measurement of blood flow.

UNIT-V(12 hrs)

6. Basic Electronics

PN junction diode, Zener diode and its V-I characteristics, half and full wave rectifiers(semiconductor type) (working qualitative ideas only).Bridge type full wave rectifier.Action of filters- Land π type.PNP and NPN transistors and charactrestics,Configurations Transistor configurations – CE transistor characteristics – h-parameters – Transistor as an amplifier.

Number system, conversion of binary to decimal and vice versa, De Morgans's theorems statements - logic gates – verification of truth tables, NAND and NOR gates as universal gates, Half and Full adders.

REFERENCE BOOKS

1. B.Sc., Physics, Vol.3, Telugu Academy, Hyderabad
2. Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath – S. Chand & Co.
3. Electricity and Magnetism, Brijlal and Subramanyam. RatanPrakashanMandir.
4. Physics for Biology & Premedical Students –DN Burns & SG MacDonald, Addison Wiley.
5. Principles of Electronics, V.K. Mehta, S.Chand & Co.,
6. Digital Principles and Applications, A.P. Malvino and D.P.Leach, Mc GrawHill Edition.

Practical Paper V: Electricity, Magnetism& Electronics

Work load: 30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. Figure of merit of a moving coil galvonometer.
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.
6. PN Junction Diode Characteristics
7. Zener Diode Characteristics
8. Transistor CE Characteristics- Determination of hybrid parameters
9. Logic Gates- OR, AND,NOT and NAND gates. Verification of Truth Tables.
10. Verification of De Morgan's Theorems.

Suggested student activities

Student seminars, group discussions, assignments, field trips, study project and experimentation using virtual lab

Examples

Seminars - A topic from any of the Units is given to the student and asked to give a brief seminar presentation.

Group discussion - A topic from one of the units is given to a group of students and asked to discuss and debate on it.

Assignment - Few problems may be given to the students from the different units and asked them to solve.

Field trip - Visit to Satish Dhawan Space Centre, Sriharikota / Thermal and hydroelectric power stations / Science Centres, any other such visit etc.

Study project - Web based study of different satellites and applications.

Domain skills:

Logical derivation, experimentation, problem solving, data collection and analysis, measurement skills

***** Documental evidence is to be maintained for the above activities.**

Paper VI: Modern Physics

(For Non-Maths Combinations)

V SEMESTER

Work load: 60 hrs per semester **4 hrs/week**

UNIT-1(10 hrs)

1. Spectroscopy

Introduction - Zeeman effect - Experimental verification – Paschen Back effect – Stark effect – Explanations (elementary ideas only) - Raman effect, hypothesis, classical and quantum theory of Raman effect. Experimental arrangement for Raman effect and its application.

UNIT-II (12 hrs)

1. Fundamentals of quantum mechanics

Photoelectric effect – Explanation through demonstration, Einstein's Photoelectric equation – its verification by Millikan's experiment –theory of Compton effect (no derivation) and its experimental verification –Bohr's theory of Hydrogen atom – Derivation of expression for energy levels and spectral series of Hydrogen atom, atomic excitation, Frank Hertz experiment.

UNIT-III (10 hrs)

3. Matter Waves and uncertainty principle

Dual nature of radiation- de Broglie's theory of matter waves, expression for wavelength, properties of matter waves, Davisson and Germer experiment on electron diffraction – Discussion of results, Wave velocity and group velocity.
Heisenberg's uncertainty principle for position and momentum (x and p), energy and time (E and t).Experimental illustrations of uncertainty principal, Complementary principle of Bohr.

UNIT-IV: (12 hrs)

4. Radioactivity and radiation protection

The nature of radioactive emissions, the law of Radioactive decay, derivation, decay constant, Half life and mean life periods - derivations, units of radio activity, Carbon and Uranium dating (explanation) - Age of earth and rocks, Radioactive isotopes as tracers, radio cardiography. Principles of radiation protection– protective materials-radiation effects – somatic, genetic stochastic & deterministic effect, Natural radioactivity, Biological effects of radiation, Radiation monitors**.**

UNIT-V (16 hrs)

5. Crystal Structure

Amorphous and crystalline materials, unit cell, Miller indices, reciprocal lattice, types of lattices, diffraction of X-rays by crystals, Bragg's law, experimental techniques, Laue's method and powder diffraction method.

6. Superconductivity:

Introduction - experimental facts, critical temperature - critical field - Meissner effect – Isotope effect - Type I and type II superconductors - BCS theory (elementary ideas only) - applications of superconductors.

REFERENCE BOOKS

1. B.Sc Physics, Vol.4, Telugu Academy, Hyderabad.
2. Molecular Structure and Spectroscopy by G. Aruldhas. Prentice Hall of India, New Delhi.
3. Physics for Biology & Premedical Students –D.N. Burns & SG Mac Donald, Addison Wiley.
4. Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath. S. Chand & Co.
5. Basic Radiological Physics Dr. K. Thayalan - Jayapee Brothers Medical Publishing Pvt. Ltd. New Delhi (2003)
6. Physics of Radiation Therapy : F M Khan - Williams and Wilkins, Third edition (2003)
7. The Physics of Radiology-H E Johns and Cunningham.

Practical Paper VI: Modern Physics& Medical Physics

Work load: 30 hrs **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 β-rays.
6. Determination of M & H.
7. Analysis of powder X-ray diffraction pattern to determine properties of crystals.
8. Energy gap of a semiconductor using junction diode.
9. Energy gap of a semiconductor using thermister.
10. Characteristics of LDR.

Suggested student activities

Student seminars, group discussions, assignments, field trips, study project and experimentation using virtual lab

Examples

Seminars - A topic from any of the Units is given to the student and asked to give a brief seminar presentation.

Group discussion - A topic from one of the units is given to a group of students and asked to discuss and debate on it.

Assignment - Few problems may be given to the students from the different units and asked them to solve.

Field trip - Visit to Satish Dhawan Space Centre, Sriharikota / Thermal and hydroelectric power stations / Science Centres, any other such visit etc.

Study project - Web based study of different satellites and applications.

Domain skills:

Logical derivation, experimentation, problem solving, data collection and analysis, measurement skills

***** Documental evidence is to be maintained for the above activities.**

Note: For all the above 8 practical papers the book "B.Sc Practical Physics" by C.L.Arora Published by S.Chand& Co, New – Delhi may be followed.

NOTE: Problems should be solved at the end of every chapter of all units.

MODEL PAPER

THREE YEAR B.Sc DEGREE EXAMINATION
CHOICE BASED CREDIT SYSTEM
FIFTH SEMESTER: PART II: PHYSICS
PAPER V: ELECTRICITY AND MAGNETISM
(FOR NON MATHEMATICS COMBINATIONS)

Time: 3 Hours Max. Marks: 75

Section-A (Essay type)

Answer All questions **Marks :10x5 = 50**

1. (a) Define Electric flux. State and prove Gauss law in electrostatics.

(OR)

(b) Define the electrical potential and derive an expression for the potential due to a charged spherical shell.

2. (a) Derive an expression for the capacitance of a parallel plate capacitor with and without dielectric medium.

(OR)

(b) Define electric displacement (D), electric field (E) and electric polarization (P) and derive the relation between D, E and P.

3. (a) Describe an experiment to measure the temperature coefficient of resistance of a material using Carey-Foster's Bridge.

(OR)

(b) State and explain Hall effect and write its importance.

4. (a) Explain Biot-Savart`s law and derive an expression for magnetic induction due to on the axis of a circular coil carrying current.

(OR)

(b) Describe the construction and working of Ballistic Galvanometer with necessary theory and write it`s uses.

5. (a) Explain half wave and full wave rectifiers using semiconductor diodes and draw input and output waveforms.

(OR)

(b) Explain the construction and working of OR, AND and NOT logic gates and verify with truth tables.

N. Venkateswara Reddy

(Dr. N. VENKATESWARA REDDY)
H.O.D of physics
S.V. Arts college, Tirupati.

Section-B (Short answer type)

Answer any three questions **Marks: 5 x3 = 15**

6. Explain equipotential surfaces with examples.

7. Derive an expression for energy stored in a capacitor.

8. State and explain Kirchoff's laws.

9. Write a short note on the electromagnetic measurement of blood flow.

10. State and prove de Morgans theorems.

Section-C

Answer any two questions **Marks: 5x2 = 10**

11. Radius of the gold nucleus is 6.6×10^{-15}m and its atomic number is 79. Calculate the potential on the surface of the gold nucleus.

12. A parallel plate capacitor with area of plates $1m^2$ and distance between the plates 0.1 mm, has a dielectric constant 5 as the medium between the plates. If this capacitor is charged to 100 V, calculate the energy stored in it.

13. A galvanometer of resistance 50Ω has current maximum 1mA. How this galvanometer is Converted into 0 to 10mA ammeter and 0 to 5 V voltmeter.

14. Calculate the self inductance of a solenoid of length 1m and area of cross section 0.01 m^2 with 200 turns.

15. Find the decimal equivalent of $(11001.011)_2$

N. Venu

(DR. N. VENUGOPAL REDDY)
H.O.D of PHYSICS
S.V. ARTS COLLEGE, TIRUPATI.

MODEL PAPER

THREE YEAR B.Sc DEGREE EXAMINATION
CHOICE BASED CREDIT SYSTEM
FIFTH SEMESTER: PART II: PHYSICS
PAPER VI : MODERN PHYSICS AND ELECTRONICS
(FOR NON MATHEMATICS COMBINATIONS)

Time: 3 Hours Max. Marks: 75

Section-A (Essay type)

Answer All questions **Marks :10x5 = 50**

1. (a) What is Zeeman effect ? Explain the experimental verification for Zeeman effect.

(OR)

(b) What is Raman effect ? Explain the experimental arrangement for Raman effect .

2. (a) What is Compton effect ? Explain its experimental verification.

(OR)

(b) Explain the Frank Hertz experiment and write its uses.

3. (a) Define de Broglie wave? Explain how Davisson and Germer predicated experimentally the electron waves predicated by de Broglie.

(OR)

(b) Explain the Heisenberg`s uncertainty principle. Describe the experimental illustrations of uncertainty principle using gamma ray microscope.

4.(a) Explain the law of Radioactive decay and derive expressions for decay constant, half life and mean life periods.,

(OR)

(b) Explain Carbon and Uranium dating with examples.

5. (a) What is Bragg`s law ? Explain Bragg`s X-ray spectrometer to determine the wave length Of X- rays.

(OR)

(b) Define the phenomenon of super conductivity, explain Meissner effect and write the uses of superconductors.

(Dr. N. VENUGOPAL REDDY)
H.O.D of PHYSICS
S.V. ARTS COLLEGE
TIRUPATI.

Section-B (Short answer type)

Answer any three questions **Marks: 5 x3 = 15**

6. Write the applications of Raman effect.
7. Explain the Einstein`s photoelectric effect equation.
8. Explain the complementary principle of Bohr.
9. Discuss the biological effects of nuclear radiation.
10. Write the properties of superconducting materials.

Section-C

Answer any two questions **Marks: 5x2 = 10**

11. The original line in an Raman experiment is 5460 A^o and the stokes line is at 5520 A^o Find the wavelength of anti-stokes line.
12. A photon of wavelength 3310 A^o falls on a photo cathode and ejects an electron of maximum energy $3x10^{-9}$ joules. Calculate the work function of the cathode material. Given that $h=6.62x10^{-34}$J-S, $c=3x10^8$ m/sec.
13. An electron has a speed of 600 m/s with an accuracy of 0.005% . Calculate the certainty with which we can locate the position of the electron. Given that $h = 6.6x10^{-34}$ joule-sec, $m = 9.1x10^{-31}$ kg.
14. The half-life period of radium is 1590 years. In how many years willone gram of pure element be reduced to one centigram ?.
15. The spacing between the principle planes of NaCl crystal in 2.82 A^o. It is found that the first order Bragg reflection occurs at an angle of 10^0. What is the wavelength of X-rays. Given that sin 10^0=0.1736.

(DR. N. VENUGOPAL REDDY)
H.O.D. of PHYSICS
S.V. ARTS COLLEGE
TIRUPATI.

MODEL PAPER

THREE YEAR B.Sc DEGREE EXAMINATIONS, NOV/DEC 2017

CHOICE BASED CREDIT SYSTEM

FIFTH SEMESTER

PART II : PHYSICS

PAPER V: Electricity, Magnetism and Electronics

(For maths combination)

(Revised syllabus w.e.f 2017-18)

Time: 3 Hours Max.Marks:75

SECTION – A (Essay type)

Answer ALL questions (5 x 10 = 50)

అన్నీ ప్రశ్నలకు సమాధానములు వ్రాయుము.

1. (a) Define electric potential. Derive an expression for the potential due to uniformly charged sphere.
విద్యుత్ శక్మమును నిర్వచించుము. ఏకరీతి ఆవేశ పూరిత గోళము వలన కలుగు విద్యుత్ శక్మమునకు సమీకరణమును రాబట్టుము.

OR

(b) Define electric field intensity (E), electric displacement (D), dielectric polarization (P); Obtain the relation between them.
విద్యుత్ క్షేత్ర తీవ్రత (E), విద్యుత్ స్థాన భ్రంశము (D) మరియు రోధక ధ్రువణము (P) లను నిర్వచించి, వాటి మధ్య సంబంధమును ఉత్పాదించుము.

2. (a) State Biot – Savart's law. By using it calculate magnetic induction 'B' due to long straight wire.
బయోట్ – సావర్ట్ నియమమును తెల్పుము. ఈ నియమమునుపయోగించి పొడవైన తిన్నని తీగ వలన కలుగు అయస్కాంత ప్రేరణ B ను కనుగొనుము.

OR

(b) State Faraday's laws of electromagnetic induction. Derive an expression for the self inductance of a solenoid.
విద్యుత్ అయస్కాంత ప్రేరణ కు సంబంధించిన ఫారడే నియమములను తెల్పుము. సొలినాయిడ్ యొక్క స్వయం ప్రేరణ కు సమీకరణమును రాబట్టుము.

3. (a) Obtain the expression for the resonance of a parallel LCR circuit. Find its Q-Factor.
సమాంతర LCR వలయము యొక్క అనునాద సమీకరణమును రాబట్టుము. వలయము యొక్క Q – గుణకమును కనుగొనుము.

OR

(b) State and prove Poynting theorem
పాయింటింగ్ సిద్ధాంతమును నిర్వచించి, నిరూపించుము.

4. (a) What is a Zener diode? In what way it is different from PN junction diode? Explain Zener mechanism.
జీనర్ డయోడు అనగానేమి? జీనర్ డయోడు PN సంధి డయోడు కంటె ఏవిధముగ విభిన్న మైనది? జీనర్ ప్రక్రియను వివరించుము.

OR

(b) What are hybrid parameters of a transistor? How they are determined.
ట్రాన్సిస్టరు యొక్క హైబ్రీడ్ పరామితులు అనగానేమి? వాటిని ఎలా కనుగొంటారు.

5. (a) Explain binary addition and substraction by 1's and 2's complement method.
ఒకట్ల మరియు రెండ్ల పూరక పద్ధతిని రెండు ద్వాంశ సంఖ్యల మొత్తము మరియు వాటి భేదాలను వివరించుము.

OR

14/6/17

(b) Discuss the working of half adder and full adder and give their truth tables.

అర్ధ సంకలని మరియు పూర్ణ సంకలని లు పని చేయు విధానమును వివరించి, వాటి సత్య పట్టికలను వ్రాయండి.

SECTION – B

ANSWER ANY THREE QUESTINONS (5 x 3 = 15)

ఏవైనా మూడు ప్రశ్నలకు సమాధనములు వ్రాయుము

6. State and prove Gauss law.

   గౌస్ నియమమును తెల్పి, నిరూపించుము.

7. State and explain Hall effect

   హాల్ ఫలితమును తెల్పి, వివరించుము.

8. Write Maxwell's equations in differential form.

   మాక్స్ వేల్ సమీకరణములను అవకలన రూపములో వ్రాయుము.

9. Explain the working of a transistor as an amplifier.

   ట్రాన్సిస్టరు వర్ధకముగ పనిచేయు విధానమును వివరించుము.

10. State and prove De-Morgan's laws.

    డీ మోర్గాన్ నియమములను తెల్పి నిరూపించుము.

SECTION – C

ANSWER ANY TWO QUESTINONS (5 x 2 =10)

ఏవైనా రెండు ప్రశ్నలకు సమాధనములు వ్రాయుము

11. Dielectric constant of a material is 5. Find its permittivity and susceptibility.

    ఒక పదార్థము యొక్క రోధక స్థిరాంకము 5. ఆ పదార్థము య్క్క ప్రవేశ్య శీలత మరియు ససెప్టబిలిటి లను కనుగొనుము.

12. Calculate the energy stored in the magnetic field of a solenoid of inductance 5mH, when a maximum current of 3A flows through it.

    5mH ప్రేరణ గల సాలినాయిడ్ గుండా గరిష్ట విద్యుత్ ప్రవాహము 3A అయిన ఆ సాలినాయిడ్ లో ఏర్పడిన అయస్కాంత క్షేత్రము లో నిల్వ ఉన్న శక్తి ఎంత?

13. A 60Hz a.c.circuit has an inductor of 10mH and 2Ω resistance. Calculate its power factor.

    60Hz పౌనఃపున్యము గల వలయము 10mH ప్రేరణ మరియు 2 Ω నిరోధమును కలిగి ఉంది. ఆ a.c. వలయము యొక్క సామర్థ్య గుణకమును కనుగొనండి.

14. The d.c. current gain of a transistor in common – emitter (CE) configuration is 200. Find the d.c.current gain in CB configuration.

    ఉమ్మడి ఉద్గారి విన్యాసములో ఒక ట్రాన్సిస్టరు యొక్క d.c. కరెంటు వృద్ధి గుణకము 200 అయితే ఉమ్మడి ఆధారి విన్యాసంలో కరెంటు వృద్ధి గుణకమును కనుగొనండి.

15. Convert the decimal numbers 18 and 123 into binary numbers.

    18 మరియు 123 దశాంశ సంఖ్యలను, ద్వి సంఖ్యామానములోనికి మార్చండి.

Baby 14/6/17

THIRD YEAR PHYSICS EXAMINATIONS

Paper-VI: **MODERN PHYSICS** (For Maths combination)

V SEMISTER

TIME:: 3Hours Max.Marks:: 75

****

Answer ALL questions from Part –A, Three from Part –B, Two from Part – C

Part –A లో అన్నిప్రశ్నలకు, Part –B లో మూడు ప్రశ్నలకు, Part – C లో రెండు ప్రశ్నలకు జవాబులు వ్రాయుము

Part –A **5X10=50Marks**

1.a) What is Zeeman effect? Describe its experimental arrangement.
జీమన్ ఫలితము అనగా ఏమి? దీని ప్రయోగ ఏర్పాటును వివరించుము

OR

b) Explain Raman Effect. Describe its experimental arrangement. Give its applications.
రామన్ ఫలితం అనగానేమి? రామన్ ఫలితం ప్రయోగ ఏర్పాట్లు వివరించుము. దాన్ని అనువర్తనాలు ఏమి?

2.a) Describe Davisson – Germer experiment with a neat sketch.
చక్కటి పటముతో డేవిస్సన్-గేర్మెర్ ప్రయోగమును వివరించండి

OR

b) Explain Heisenberg Uncertainty Principle. Describe Gamma ray microscope
హైసన్ బర్గ్ అనిశ్చితత్వ నియమును వివరింపుము. గామ కిరణ సూక్ష్మ దర్శినిని వివరీకరించుము

3.a) Derive Schrodinger time independent and time dependent wave equations
(or) శ్రోడింగర్ కాలస్వతంత్ర మరియు కాలాధర తరంగ సమీకరణాలు ఉత్పాదించండి.

OR

b) Derive Schrodinger wave equation to particle in one dimensional box.
ఏకమితీయ పెట్టెలోని కణమునకు ష్రోడింగర్ సమీకరణమును ఉత్పాదించుము.

4.a) Describe the Liquid drop model of the nucleus
కేంద్ర ద్రవబిందు నమూన గురించి విపులముగా వివరించండి

OR

b) Explain Gamow's theory of Alpha decay
ఆల్ఫా క్షీణతకు గామో సిద్ధాంతం వివరింపుము.

5.a)Derive Bragg's law. Explain the Powder method to determine crystal structure.
బ్రాగ్ సూత్రము ఉత్పాదించండి. స్పటిక నిర్మాణం కనుగొనడానికి చూర్ణ పద్ధతిని వివరించండి.

OR

b) Explain Type I and Type II Super Conductors.
మొదటి మరియు రెండొవ రకము అతివాహకాలను వివరింపుము

Part –B **3X5=15 Marks**

6. Explain L-S and J-J Coupling
L-S మరియు J-J సంధానములను వివరించుము

7. Write Properties of matter waves.
ద్రవ్య తరంగాల ధర్మాలను వ్రాయుము

8. Eplain postulates of quantum Mechanics
క్వాంటమ్ యాంత్రిక శాస్త్రము యొక్క ప్రతిపాదనలు వ్రాయుము

9. Explain Geiger Nuttal law
గైగర్ న్యూటల్ నియమమును వివరింపుము

10.Explain Meissner effect.
మెస్నర్ ఫలితమును వివరింపుము.

14/6/17

Part –C 2X5=10 Marks

11. In a Raman experiment the sample is excited by 5460 A^0 and the Stokes line is at 5560A^0. Find the wavelength of the anti stokes line.
రామన్ ప్రయోగంలో పదార్థాన్ని 5460 A^0 రేఖతో దీపనం చేసారు. స్టోక్స్ రేఖ తరంగ ధైర్ఘ్యం 5560A^0. విరుద్ధ స్టోక్స్ రేఖ తరంగ ధైర్ఘ్యం కనుగొనండి.

12. Find the energy of the Neutron in eV whose deBroglie wavelength is $1A^0$. $h=6.6x10^{-34}$ j-s
ఒక న్యూట్రాన్ తరంగధైర్ఘ్యం $1A^0$, $h=6.62x10^{-34}$ j-s అయితే దాని శక్తి కనుగొనండి.

13. An electron of mass $9x10^{-31}$Kg is inside a box of length 10^{-8}cm. Find its minimum energy.
$9x10^{-31}$Kg ద్రవ్యరాశి గల ఒక ఎలెక్ట్రాన్ 10^{-8}cm పొడవు గల ఒక పేటికలో చలిస్తుంటే, దాని కనిష్ట శక్తి ఎంత.

14. Determine the binding energy of deuteron nucleus.Mass of deuteron nucleus is 2.013553 amu.
డ్యూటరాన్ బంధన శక్తికి లెక్కించుము. డ్యూటరాన్ కేంద్రక ద్రవ్యరాశి 2.013553 amu.

15. Calculate the critical current which can flow through a long thin superconductor wire of diameter 10^{-3}m. given $\mu_c = 7.9x10^3$ amp/m.

ఒక సన్నని అతి వాహక తీగ వ్యాసం 10^{-3}m, దానిలో ప్రవహించే సంధిగ్ధ విద్యుత్ ప్రవాహాన్ని లెక్కించండి.
$\mu_c = 7.9x10^3$ amp/m

****

14/6/17