# B.S.C. PHYSICS WITH MATERIAL SCIENCE & COMPULSORY DIPLOMA IN INSTRUMENTATION

## Scheme of Examinations (CBCS Pattern)

(For the students admitted during the academic year 2008-2009 and onwards)

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<th>Part</th>
<th>Study Components</th>
<th>Course Title</th>
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| Total | 3800 | 140 |

* For subjects without practical ** For subjects with Practical @ No University Examinations. Only Continuous Internal Assessment (CIA) # No Continuous Internal Assessment (CIA). Only University Examinations.

### List of Elective papers (Colleges can choose any one of the paper as electives)

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SEMESTER – I

CORE PAPER I  HEAT AND THERMO DYNAMICS

No. of Credit Hours : 3 per week

Subject Description :
This paper presents the principle of heat and Thermo dynamics.

Goal:
To enable the students in order to learn the basic principles and concepts of Heat and Thermodynamics

Objectives
The aims is to provide the students
- To understand the principles of calorimetry
- understand the basic principle and laws of thermodynamics
- understand the concepts of entropy

UNIT I

UNIT II

UNIT III

UNIT IV
UNIT V  
(9 hrs)
Concept of entropy: Change in entropy in reversibility and irreversibility process entropy of an ideal gas – temperature entropy diagram – increase of entropy in any irreversible process – Thermo dynamics functions – Maxwell’s thermodynamics relations and applications – Joule – Kelvin effect (theory)- Claussius and Clapeyron equation.

Text Book
Thermal Physics, R. Murugesan, I Edi, 2002
Heat & Thermodynamics, Brijlal & N. Subramaniam

Reference Books
1. Heat and Thermodynamics – Sears & Semansky
3. Heat and Thermodynamics – Agarwal, Singhal, Sathyaparakash
4. Thermal Physics – H.C. Saxena and Agarwal

SEMESTER – I

CORE PAPER II MECHANICS, PROPERTIES OF MATTER AND SOUND

No. of Credit Hours: 3 per week

Subject Description:
This paper presents the principle of motion of rigid bodies, liquids and knowledge sound energy.

Goal:
To enable the students in order to learn the basic principles, theory and concepts of matters, sound and mechanics.

Objectives
To gain knowledge by the students in order to
- learn motion of bodies and sound waves
- acquire basic knowledge of mechanics, properties of matter and gravitation
- know how to apply the conservation of rotational motion

UNIT I  
(9 hrs)

UNIT II  
(9 hrs)
Motion of rigid body
UNIT III (9 hrs)
Gravitation: Kepler’s Law of Planetary motion – Laws of gravitation – Boy’s method for G – Gravitational potential – Gravitational field at a point due to spherical shell – Variation of ‘g’ with latitude, altitude and depth.

UNIT IV (9 hrs)
Surface Tension: Definition and dimension of surface Tension – Excess of Pressure over curved surface – Variation of S.T. with temperature Jaeser’s Experiment.

UNIT V (9 hrs)

Text Books
1. Properties of Matter – Brijlal. and N. Subramaniam - S Chand & Co
2. Text Book of Sound – Brijlal. and N. Subramaniam - S Chand & Co

Reference Books
2. University Physics – Sears Semansky and Ground
3. Text books of Sound - Ghosh

SEMESTER – II
CORE PAPER III ELECTRICITY AND MAGNETISM

No. of Credit Hours: 6 per week

Subject Description:
This paper presents the basic principle of charged body, when they are in rest and also under motion. This paper gives the knowledge regarding the electrical energy and magnetic energy.

Goal:
To enable the students in order to learn the basic principles theory and concepts of electricity and magnetism.
Objective
To gain knowledge about the electrical energies in order to
- learn motion of charges
- acquire basic knowledge of magnetic properties
- know about the alternating current and its circuits
- get a depth of knowledge in electricity and magnetism

UNIT I  (18 hrs)
Gauss theorem and its applications
Normal electric induction L Gauss theorem, application of guass theorem; electric intensity at a point immediately adjacent to a charged conductor; energy stored in unit volume of an electric field.

Capacitance and Capacitors
Spherical capacitor: Cylindrical capacitor, Force of attraction between charged plates of a capacitor I change in the capacitance – capacity of a parallel plate capacitor; effect of introducing a dielectric slab between the plates – Guard ring condenser polarization in dielectric materials.

UNIT II  (18 hrs)
Magnetic Properties of materials
Electron theory of magnetism; dia, para, ferromagnetism; magnetic field B; magnetization M; magnetic field intensity H; magnetic susceptibility and magnetic permeability; magnetic materials and magnetization; magnetic hysteresis area of the hysteresis loop; determination of susceptibility : Guoy’s method – magnetic circuits - comparison of magnetic with electrical circuits.

UNIT III  (18 hrs)
Thermo Electricity: Seebeck effect: Laws of thermo e.m.f; Peltier effect; Peltier Co-efficient, determination of Peltier co-efficient a junction; thermo dynamical consideration of Peltier effect; Thomson effect; Thomson Co-efficient; e.m.f generated in a thermocouple taking both Peltier effect and Thomson effect in the metals; Thermo electric power; Application of thermodynamics to Thermocouple ; Thermoelectric diagrams and their uses.

UNIT IV  (18 hrs)
Helmholtz equation of varying current
Growth and decay of current in an inductive – resistive circuit charging and discharging of a capacitor through a resistance; charging and discharging of capacitor through an inductance – oscillatory circuits- Force on a current carrying conductor; Theory of Ballistic Galvanometer.

UNIT V  (18 hrs)
Dynamics of charged particles
Charged particles in a uniform and constant electric field; Charged particles in an alternating electric field; Charging particles in a uniform and constant magnetic field; magnetic focusing ; charged particles in combined electric and magnetic field when the fields are parallel and are in mutually perpendicular direction.

Books for Study
1. Electricity and Magnetism – Brijlala and Subramaniam
2. Electricity and Magnetism – R. Murugesan

Books for Reference
1. Electricity and Magnetism – D.N. Vasudeva
2. Electricity and Magnetism – Nagarathanam and Lakshminarayan
3. Fundamental of Electricity and Magnetism
   – B.D.Duggal and C.L. Chhabra

CORE PRACTICAL I

Credit Hours : 3 hours per week

ANY FOURTEEN EXPERIMENTS ONLY
(EXAMINATION AT THE END OF SECOND SEMESTER)

1. Compound Pendulum.
2. Comparison of Viscosities – Capillary Flow Method
3. Young’s Modulus – Non- Uniform bending – Pin and Microscope
4. Young’s Modulus – Uniform bending – Optic lever
5. Rigidity modulus – Static Torsion – Scale and Telescope
6. Sonometer – Frequency of A.C.
7. Spectrometer – Refractive index of Solid Prism
8. Resonance Column – Velocity of Sound
9. Moment of magnet – Tan C Position
10. Characteristics of a Junction Diode
11. Spectrometer – (i.d) Curve
12. Air Wedge – Thickness of Wire
13. Field along the axis of a coil – Moment of a Magnet
14. Potentiometer – Specific Resistance of a wire
15. Potentiometer – Low range Ammeter Calibration
16. Young’s Modulus – Cantilever – Depression – Scale and Telescope
17. Young’s Modulus – Cantilever – Dynamic Method
18. Viscosity by Capillary flow method
19. Melde’s Strings – Frequency of Vibrator.
SEMESTER - III
CORE PAPER IV  OPTICS

No. of Credit Hours : 4 hours per week

Subject Description
To study the optical instrument objects in images propagation of light, nature and behaviour of light, vibration of light laser and as application

Goal and objectives
To provide a good foundation in optics
To provide a knowledge of the behaviour of light
To inspire interest for the knowledge of concepts

UNIT 1 - Geometrical Optics  (12 hrs)
Aberrations-- Spherical aberrations in lens—coma—Astigmatism-- chromatic aberration-- dispersion by a prism-- Cauchy’s dispersion formula-- dispersive power, achromatism in prism-- dispersion without deviation-- chromatic aberrations in a lens-- circle of least confusion, achromatic lens--condition for achromatism of two thin lenses separated by a finite distances.

UNIT 2 Interference  (12 hrs)

UNIT 3 Diffraction  (12 hrs)

UNIT 4 Polarization  (12 hrs)
Double Refraction – Huygen’s explanation --Optic axis in the plane of incidence inclined and parallel, perpendicular to the crystal surface – Production and Detection of Plane, Circularly and Elliptically Polarized light – Optical Activity – Fresnel’s explanation – Specific rotation – Half Shade Polarimeter.

UNIT 5 Quantum Optics  (12 hrs)
Books for Study
1. A Text book of Optics        Brijlal & Subramaniam
2. Modern Physic              R Murugesan

Books for Reference
3. Optics and Spectroscopy R Murugesan
4. Optoelectronics        Thiyagarajan

SEMESTER – III

DIPLOMA PAPER I    INSTRUMENTATION I

Subject Description
To study the instrument with its principle and observe the method their functioning

Goal and objectives
✓ To provide a good foundation in measurements
✓ To provide a knowledge of the behaviour of instruments
✓ To inspire interest for the knowledge of concepts regarding measurements

UNIT 1          (9 hrs)
Basic Concept of Measurement
Introduction – System configuration – Problem Analysis – Basic Characteristics of measuring devices – Calibration

Transducers

UNIT 2          (9 hrs)
Performance Characteristics of an Instrumentation system

UNIT 3          (9 hrs)
Pressure Measurement
Mechanical Pressure measurement devices – Bourdon tube Pressure gauge – The Bridgeman gauge – Dead weight tester – Low Pressure measurement – The Mc lead gauge – Pirani thermal conducting gauge- The Knudsen gauge.

Unit 4          (9 hrs)
Flow Measurement
Unit 5 (9 hrs)

Measurement of Temperature

Book for Study
Unit 1 & 2: Instrumentation Devices and Systems – C S Rangan, G R Sharma, V S V Mani TMH.
Unit 3 & 4: Experimental Methods for Engineers – Jacy P Hofman, TMH.
Unit 5: Experimental methods for experiments by Jack P Holman

SEMESTER – IV

CORE PAPER V ATOMIC PHYSICS AND NUCLEAR PHYSICS

No. of credit hours : 4 hours per week

Subject Description
Analysis of Atom, modeled in various aspects, spectral lines subjected to magnetic fields, light inducing electron emission, X-rays and the nuclear concepts of the atom.

Goals and Objectives
✓ To provide a detailed study of atom
✓ To learn the impact of magnetic fields on spectra
✓ To learn the behaviour of nucleolus in various states
✓ To provide a knowledge of the application of observed theories

Unit 1 Magneto Optical Properties of Spectrum (12 Hrs)

Unit 2 Photoelectric Effect (12 Hrs)
Introduction – Richardson and Compton experiment – Relation between Photoelectric current and retarding potentials – Relation between Velocity of Photo electrons and the frequency of light – Laws of Photoelectric emission – Failure of electromagnetic theory – Einstein’s Photo electric equation – Experimental verification – Millikan’s Experiments – Photo electric cells – Photo emission cell – Photo Voltaic cell – Photo conductive cell – Applications of Photo electric cell.

Unit 3 X-ray Spectra (12 Hrs)
X-ray – Coolidge tubes – Properties – X-ray Spectra – Continuous and characteristics X-ray spectrum – Mosley’s law (Statement, Explanation and Importance) – Compton effect –
Expression for change of wave length - 
X-ray diffraction-Bragg’s law - Bragg’s spectrometer - Powder crystal method.

**Unit 4 – Radioactivity**  
(12 hrs)

**Unit 5 - Nuclear Fission and Fusion Reactions**  
(12 hrs)

**Book for Study:**
1. Modern Physics  
   R Murugesan (S. Chand & Company)

**Books for Reference**
1. Modern Physics  
   Sehgal Chopra Sehgal
2. Source book on Atomic Energy  
   Galsstons (S)
3. Atomic Physics  
   Rajam
4. Introduction to Atomic Spectra  
   White (HE)
5. Nuclear Physics  
   D C Tayal
6. Concept of Modern Physics  
   Arthur Beiser
7. Introduction to Modern Physics  
   F K Richtmyer Etal

**SEMESTER – IV**

DIPLOMA PAPER II  
INSTRUMENTATION II

**No. of Credit Hours : 3 Hours**

**Subject Description**
To study the instrument with its principle and observe the method their functioning

**Goal and objectives**
- To provide a good foundation in measurements
- To provide a knowledge of the behaviour of instruments
- To inspire interest for the knowledge of concepts regarding measurements

**UNIT 1**  
(9 Hrs)
**Temperature Measurement by Radiation:**
**Thermal and transport property Measurement.**

**UNIT 2**
**Force, Torque and Strain Measurements**
(9 Hrs)

**UNIT 3**
**Vibration**
(9 Hrs)

**UNIT 4**
**Thermal and Nuclear Radiation Measurements**
(9 Hrs)

**UNIT 5**
**Air Pollution Sampling and Measurements**
(9 Hrs)

**Books for Study:**
Unit 1, 2, 4 to 5: Experimental methods for Experiments by Jack P Holman
Unit 3: Instrumentation Devices and Systems –
C S Rangan, G R Sharma, V S V Mani TMH.

**CORE PRACTICAL – II**
(Examination at the end of Fourth Semester)
Any Fourteen (14) Experiments only
1. Rigidity Modulus – Torsional Pendulum – With & Without symmetrical masses
2. Quincke’s method – Surface Tension and Angle of Contact of Mercury
3. Specific heat capacity – Newton’s law of cooling – Spherical calorimeter
4. Spectrometer – Hollow prism – Refractive index of the Prism
5. Determination of $M_H$ and $B_H$
6. Zener diode - Characteristics
7. Spectrometer – (i – i’) curve
8. Newton’s rings – Refractive index of a lens
9. Reduction factors of a Tangent Galvanometer - BG
10. Comparison of Mutual Inductance - BG
11. Spectrometer – Grating – Minimum deviation & Normal Incidence
12. Young’s Modulus – Koenig’s Method – Non Uniform bending
14. Spectrometer – Cauchy’s constant
15. Spectrometer – Dispersive Power
16. Spectrometer – Narrow Angled Prism
17. Carey Foster’s Bridge – Temperature Coefficient
18. Potentiometer – Reduction factor of T.G in Primary
19. Potentiometer – EMF of a thermocouple
20. B.G - Absolute Capacity

SEMESTER – V
CORE PAPER VI  MATHEMATICAL PHYSICS

No. of credit hours : 5 per week

Subject Description :
This paper presents the fundamental of classical mechanics special functions and matrices which will be used for studies solving problems during research work.

Goal:
To enable the students to acquire the problem solving ability and to apply the equations for the situation of different physical problems.

Objectives
- To acquire knowledge and apply it to various physical problems
  - Various physical problems
  - To apply the develop the problem solving ability.
  - To motivate the students to apply matrices or solving problems in spectroscopy, nuclear physics etc.,
  - To apply vectors to non-linear dynamics

UNIT 1  (15 Hrs)
Classical Mechanics - I
UNIT 2  
(Classical Mechanics – II)  
(15 Hrs)

UNIT 3  
(Special Functions)  
(15 Hrs)

UNIT 4  
(Matrices)  
(15 Hrs)

UNIT 5  
(Vector Calculus)  
(15 Hrs)

Books for Study and Reference
1. Mathematical Physics     B D Gupta
2. Mathematical Physics     Rajput
3. Classical Mechanics     Gupta Kumar & Sharma
4. Mathematical Physics     K N Pillai
5. Mathematical Physics     Sathiya Prakash
6. Mathematical Physics     H K Dass
7. Mathematical Physics     Gupta Kumar & Sharma

SEMESTER – V
CORE PAPER VII  APPLIED ELECTRONICS

No. of credit hours : 4 hours per week
Subject Description :
This paper presents the fundamentals of electronics and its theory which will be used for studies solving problems during research work.
Goal:
To enable the students to acquire the knowledge of electronics and to apply the principles for the situation of different physical problems.

Objectives
To acquire knowledge and apply it to
- Various electronics instruments
- To apply the development of the electronic instruments.
- To motivate the students to apply the principles of electronics in their day – to – day life.

UNIT 1 – Amplifiers (12 hrs)
Characteristics of an amplifier, Voltage amplifiers - Feed back amplifier- feed back and related terms- block diagram of a feed back amplifier-Transfer gain of an amplifier with feedback- Emitter follower circuit - an example of negative feedback.

UNIT 2 – Oscillators (12 hrs)
Introduction - Types of oscillators - Fundamental principle of oscillators - Concept of feedback oscillators - Hartley oscillators –Analysis - Colpitts oscillators –Analysis - Phase shift oscillators-Analysis - Wien bridge oscillator – Analysis.

UNIT 3 -- Solid state switching circuits (12 hrs)

UNIT 4 -- Wave Shaping Circuits (12 hrs)

UNIT 5 -- Power Electronics (12 hrs)

Book for Study and Reference
1. Foundation of Electronics D Chattopadhyaya & R C Raksjti
2. Principles of Electronics V K Metha
3. Applied Electronics R S Sedha
4. Integrated Electronics Millman and Halkias
5. Electronics devises and Circuits Millman and Halkias.
SEMESTER – V  
CORE PAPER VIII
SOLID STATE PHYSICS

No. of credit hours : 4 hours per week

Subject Description : 
This paper presents the fundamentals of solids and its bond theory which will be used for studies solids, how they are formed.

Goal: 
To enable the students to acquire the knowledge of electrons and their bonds with the external applied force as well as the interval attractive force.

Objectives
   - To acquire knowledge of
     1. Various bond theory
     2. And to know the method of forming different alloys, conducting materials.
     3. To motivate the students to apply the principles of bond theory in their research studies.

UNIT 1  
(12 hrs)
Crystallography: Distinction between crystalline and amorphous solids – Different features of the crystal – Crystal lattice – Basis – Crystal structure – Unit cell – Number of lattice points per unit cell- Bravise lattices – Miller indices – Elements of Symmetry – Structure of KCl and NaCl crystal – Atomic Packing – Atomic radius —Lattice constant and density- Crystal structure (sc; hcp; fcc;bcc.)

UNIT 2  
(12 hrs)

UNIT 3  
(12 hrs)

UNIT 4  
(12 hrs)

UNIT 5  
(12 hrs)
Dielectrics- Dielectric constant and displacement vector- Clausiss mossotti relation- Atomic or molecular polarizability – Types of polarizability -Super conductivity – Phenomena – magnetic

**Books for Study:**
1. Solid State Physics Gupta and Kumar
2. Modern Physics R Murugesan

**Books for Reference:**
1. Introduction to Solid State Physics Charles Kittel
2. Solid State Physics A J Dekker

SEMESTER – V
CORE PAPER IX
PRINCIPLES OF DIGITAL ELECTRONICS AND MICRO PROCESSORS

No. of credit hours : 3 hours per week

**Subject Description**
This paper presents basic principles of digital electronics. This paper gives deep knowledge to the students regarding number system, arithmetic building blocks, memories and data processing circuits.

**Goal**
To enable the students to learn the basic principles, theory and concepts of number system memories and data processing circuits counters

**Objectives**
To give description for the students in order to
- Learn the logic circuits
- Acquire basic knowledge of binary addition
- Understand the action and application of counters
- Get a deep knowledge of various memories used in computer circuits

**UNIT 1 - Arithmetic Circuits**
(9 hrs)

**Flip – Flops:**

**UNIT 2 - Shift Register and Counters**
(9 hrs)
UNIT 3 - Semiconductor Memories  (9 hrs)
Basic – Memory addressing – ROM’s PROM’s and EPROM’s – RAM’s – DRAM’s – Dynamic RAM’s.
D/A and A/D Conversion:

Unit 4 - Microprocessor and Data Representation  (9 hrs)

Unit 5 Semi Conductor Memories  (9 hrs)
Introduction – Registers – Primary memory – Mass storage, cache – off line backup – memory chips – static and dynamic RAMs, ROMs and their versions characteristics of memories : Memory chip capacity and organization – memory size – combining the chips together with example electrical signals. Static RAM : Organisation of 6264 – Read and write cycle of 6264 – dynamic RAMS : Organisation of 51100 x – Read and write cycle of 51100 x RAS only fresh hidden fresh – Burst and distributed i.e., fresh – pseudo static ram and automatic refresh.

Books for Study:

Books for Reference:
1. Integrated Electronics – Millmann & Halkeias

SEMESTER – V
DIPLOMA PAPER III   INSTRUMENTATION III

No. of Credit Hours : 3 Hours per week
Subject Description
To study the instrument with its principle and observe the method their functioning
Goal and objectives
✓ To provide a good foundation in measurements
✓ To provide a knowledge of the behaviour of instruments
✓ To inspire interest for the knowledge of concepts regarding measurements
UNIT 1
Data Acquisition and Conversion

UNIT 2
Input – Output Devices and Displays

UNIT 3
Basic meter movements

UNIT 4
Digital Instruments

UNIT 5
Oscilloscope

Book for Study:
Unit 1 & 2: Instrumentation Devices and Systems – C S Rangan, G R Sharma, V S V Mani TMH
Unit 3, 4 & 5: Electronic Instrumentation by H S Kalsi TMH

SEMESTER – VI
CORE PAPER X
QUANTUM MECHANICS AND RELATIVITY

No. of credit hours : 6 hours per week

Subject Description :
This paper presents the fundamentals of wave mechanics, Schrödinger’s wave equation and its applications.
Goal:
To enable the students to acquire the problem solving ability and to apply the Schrödinger’s wave equation for the situation of different physical problems.

Objectives
- To acquire knowledge and apply it to
  - Various physical problems
  - To apply the develop the problem solving ability.
  - To motivate the students to apply Schrödinger’s equation or solving problems in wave mechanics, nuclear physics etc.,

UNIT 1- Wave Properties of Matter (18 hrs)

UNIT 2 - Uncertainty Principle (18 hrs)

UNIT 3 - Schrödinger’s Wave Equation (18 hrs)

UNIT 4 - Spherical Symmetrical systems (18 hrs)

UNIT 5 – Relativity (18 hrs)
Books for Study:
1. Quantum Mechanics               S.P Singh and M.K Banda
2. Modern Physics                  R Murugesan

Books for Reference:
1. Quantum Mechanics               Schiff
2. Introduction to Modern Physics  F.K Richtmyer Etal

SEMESTER – VI
CORE PAPER XI
PRINCIPLES OF PROGRAMMING CONCEPTS AND C PROGRAMMING

Subject Description
This subject deals with the programming concepts of C language

Goal
To learn about C programming with various features

Objectives
On successful completion of this subject the student should have.

- Writing programming ability on scientific and mathematical problems
- It is very useful to the students in many ways like their higher studies and research etc., because of its versatility.

UNIT I  (12 hrs)

UNIT II (12 hrs)

UNIT III (12 hrs)

UNIT IV (12 hrs)
UNIT V

Need for user defined functions – A multifunction program – RETURN values and their
types – functions calls – category of functions – no arguments and no return values – simple
programs.

Text Book
1. “Programming in ANSI C” by E. Balagurusamy, 3rd Edition

Reference Book
Programming in C by Ashok N. Kamthane First Indian Print 2004, Pearson.

SEMESTER – VI
CORE PAPER XII
OBJECT ORIENTED PROGRAMMING WITH C++

No of credit hours : 5 hours per week

Subject Description :
This subject deals with the programming concepts of object oriented programming using
C++

Goal:
To learn about object oriented programming concepts with different features

Objectives
On successful completion of this subject the student should have

- Writing program ability on oops concepts like encapsulation, data abstraction,
  Inheritance, polymorphism and overloading etc.
- To implement various scientific and mathematical problems with minimum no. of lines.

UNIT I

Software evolution – Procedure Oriented programming object oriented programming (oop) –
Basic concepts benefits of OOP – Objeqt oriented languages – Application of OOP – A simple
C++ program – Structure of C++ program- Tokens – Key words- Identifiers and constants Basic
data types – User defined Data Types – Derived data types – symbolic constants – Type
compatibility – Declaration of variables – Dynamical Initialization of variables – Reference
variables – Operators in C++ - Scope resolution operators.

UNIT II

The main function – Function prototyping – call be reference – Inline functions – Default
arguments – Function overloading – Math library functions - classes and objects.

UNIT III

Constructors and destructors – operator over loading and type conversions

UNIT IV

Inheritance : Extending classes – Pointers- Polymorphism – pointers to objects – this
pointer pointers to derived classes.
UNIT V  (15 hrs)
Virtual functions – pure virtual functions – Managing console I / o operators.

Text Book

CORE PRACTICAL – III– ELECTRONICS PRACTICAL
(EXAMINATION AT THE END OF SIXTH SEMESTER)
ANY SIXTEEN (16) EXPERIMENTS ONLY

1. Bistable Multivibrator
2. R.C. Coupled Amplifier – Transistor single stage
3. Hartley Oscillator – Solid State
4. Colpitt’s Oscillator – Solid State
5. Tuned Plate Oscillator
6. Tuned Grid Oscillator
7. Astable Multivibrator
8. Series and Parallel resonance circuits
9. Differential Circuit and Integrating Circuit
10. Clipping and Clamping Circuits
11. Study of Solar Cell
12. Logic Gates – Discrete components
13. Emitter Follower
14. IC – Regulated Power Supply
15. Transistor – Regulated Power Supply
16. Dual Power Supply
17. Square wave generator using 555 IC
18. Study of LDR
19. UJT Characteristics
20. Bridge rectifier with voltage regulation
21. junction diode & Zener diode Characteristics

CORE PRACTICAL – IV DIGITAL AND MICROPROCESSOR
(EXAMINATION AT THE END OF SIXTH SEMESTER)
ANY SIXTEEN (16) EXPERIMENTS ONLY

1. Verification of Truth tables of IC gates: OR, AND, NOT, XOR, NOR and NAND.
2. NAND as universal building block- AND, OR, NOT
3. Verification of De Morgan’s theorem.
4. Boolean Algebra –problem solving
5. Study of RS Flip-Flop.
7. Decade counter using 7490.
8. Half adder.
9. Full adder
11. 4 BIT – Binary Adder & Subtractor using 7483.
12. Code converter (Binary to gray and vice versa) & Seven segment Decoder
14. Parity check logic.
15. Up/Down Counter using 74190
16. 8085 ALP for 8 bit Addition and Subtraction
17. 8085 ALP for One’s Complement, Masking off most significant 4 bits and setting bits.
18. 8085 ALP for Two’s compliment Addition and Subtraction
19. 8085 ALP for 8 Bit Multiplication and Division
20. 8085 ALP for finding the Biggest number element in the array and Sum of the elements in the Array

**CORE PRACTICAL – V**

**C AND C++**

**ANY SIXTEEN (16) EXPERIMENTS ONLY**

**Programming in C**
1. Find the number of Days elapsed between two dates.
2. Convert Integer in the range 1 to 100 in words.
3. Write a program that uses functions to compare two strings input by user. The Program should state whether the first string is less than, equal or greater than the second Strings.
4. Write a Program to compare two files printing the Character position where they equal and where they are differ.
5. Write a Program for Matrix addition
6. Write a Program for Matrix Multiplication.
7. Write a Program for Addition of Two times
8. Write a Program for find the Inverse of given Matrix
9. Write a Program for display the Multiplication table.

**Programming in C++**
1. To read any two number through the key board and to perform simple Arithmetic Operation (Use Do while loop)
2. To display the name of the day in a week, depending upon the number entered through the keyboard using Switch – case statement.
3. To read the elements of the given two matrix of m X n and to perform the Matrix addition
4. Write a Program for Matrix Multiplication table.
5. Write a Program to find the Inverse of Given m X n Matrix
6. Write a Program to find the Modulus of the Given Number
7. Write a Program to compare two files printing the character position where they are equal and where they are differ.
SEMESTER – VI
DIPLOMA PAPER IV
INSTRUMENTATION PRACTICAL
(Any Twelve)

1. Construction and Service of Power supply - 2, 4, 6 Volts
2. Regulated power supply construction and service - 5V & 12V
3. Dual power supply construction and service - (-12)-0- (+12)
   1. Regulated power supply service - 5V & 12V
   2. Dual power supply service - (-12)-0- (+12)
3. Servicing - Microscope
   1. Servicing Telescope
4. Servicing - Spectrometer
5. Servicing - Galvanometer,
6. Servicing - Voltmeter
7. Servicing - Ammeter.
8. Servicing --UPS
9. Servicing ---Stop clock and Stop watch
10. Servicing ---Physical Balance
11. Servicing.—Mixie
12. Servicing.—Resistance box and Capacitance box
13. Servicing --- Signal Generators
14. Fixing and servicing a B.G.
15. Cutting, drilling, polishing and trimming.
16. Servicing.—Iron Box
17. Conversion of Galvanometer to an ammeter and voltmeter.

SEMESTERS : V
ELECTIVE PAPER I- A
BASICS OF MATERIAL SCIENCE

Subject Description
This paper presents basic principles of material science. This paper gives deep knowledge to the students regarding the bonds and its nature.

Goal
To enable the students to learn the basic principles, theory and concepts of matter and their binding conditions.

Objectives
To give description for the students in order to
- Learn the bonds
- Acquire basic knowledge of atomic forces between neighboring atoms.
- Understand the action and application of atomic forces.
UNIT I (12 hrs)

UNIT II (12 hrs)
Crystal structure: Crystal symmetry – crystal systems and classes – unit cell and space lattice – crystal structures – miller indices and crystal planes – crystal directions – ionic, covalent and metallically – bonded structures electron diffraction and neutron diffraction.

UNIT III (12 hrs)

UNIT IV (12 hrs)

UNIT V (12 hrs)

Books for Study
Material Science and Processes  S.K. Hajradhoudhury (Reprinted 1986)
Material Science  Arumugam

SEMESTER: VI
ELECTIVE PAPER II -A
MATERIALS AND ITS BEHAVIORS

Goal:
To learn about the behaviour of materials.

Objectives
On successful completion of this subject the student should have
- The knowledge of binding conditions of atom in the materials.
- The application knowledge of the concept of bonds.
UNIT I
(12 hrs)

UNIT II
(12 hrs)

UNIT III
(12 hrs)

UNIT IV
(12 hrs)

UNIT V
(12 hrs)

Books for study
Unit I to IV: Material science by G.B.S NARANG Khanna Publisher Fifth Edition

SEMESTER: VI
ELECTIVE PAPER III-A
MATERIALS FOR SPECIAL APPLICATIONS

Subject Description:
This subject deals with the application material science.

Goal:
To learn about the application and uses of materials in day-to-day life.

Objectives
On successful completion of this subject the student should have
- The knowledge of applied science in practical life.
- To implement various scientific and mathematical problems with materials science.
UNIT 1 SUPERCONDUCTIVITY AND SEMICONDUCTOR MATERIALS
(12 hrs)
Introduction to semiconductor – intrinsic and extrinsic semiconductors - Band structure of semiconductors – Impurity semiconductors – Preparation of single crystal semiconductor.

UNIT II POLYMERS (12 hrs)
Classification of polymers – structure – Property correlation – Molecular weight – Crystallinity in polymers – Mechanical properties – Applications

UNIT III MATERIAL OF NUCLEAR ENGINEERING (12 hrs)

UNIT IV MATERIALS FOR SPACE ENGINEERING (12 hrs)

UNIT V MODERN TECHNIQUES FOR MATERIAL STUDIES (12 hrs)

BOOKS FOR STUDY