HINDI MAHAVIDYALAYA

(AUTONOMOUS & NAAC RE-ACCREDITED)

(Affiliated to Osmania University)

Nallakunta, Hyderabad-44

B.SC. III YEAR SEMESTER V & VI

DEPARTMENT OF PHYSICS

2018-2019

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University Nominee
Dr. G. Prasad-Chairman, BOS
Department of Physics.
Osmania University
Hyderabad.

Professor
Physics Department
University College Of Sciences
Osmania University, Hyd-7.

Dr. J. Siva Kumar
Head, Department of Physics.
Osmania University
Hyderabad.

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University College of Science
Osmania University, Hyd-

Members of BOS

1. Prof.M.V Ramana Reddy
   Department of Physics.
   Osmania University
   Hyderabad

2. Mrs. Kirana
   Assistant Professor
   Department of Physics.
   Osmania University
   Hyderabad.

3. Dr. D. Sarala
   Head Department of Physics.
   St. Anns Degree College for women
   Hyderabad.

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
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Board of Studies Meetings held at Committee Room on 18/8/18

COMPOSITION OF THE BOARD OF STUDIES IN AN AUTONOMOUS COLLEGE

I. Composition: Department of Physics

1. Head of the department concerned (Chairman)
   Smt. Dr. B.Sreedevi – Department of Physics

B.Sreedevi

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2. The entire faculty of each specialization.
   1. Smt. Dr. B.Sreedevi

3 One expert to be nominated by the vice-chancellor from a panel if six recommended by the College Principal.

1. Dr. G. Prasad, Chairperson, BOS, Dept. of Physics, Osmania University, Hyderabad.
2. Dr. J. Siva Kumar, Head, Dept. of Physics, O.U., HYD.

4. THREE (~~two~~) experts in the subject from outside the college to be nominated by the Academic Council.
   1. Prof. M.V Ramana Reddy, Department of Physics. Osmania University Hyderabad.
   2. Mrs. Kirana, Assistant Professor, Department of Physics. Osmania University,Hyderabad.
   3. Dr. D. Sarala, Head Department of Physics, St. Anns Degree College for women,Hyderabad.

18/8/18
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D Sarala
18/8/18

Professor
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University College Of Scie
Osmania University, Hy

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AGENDA OF THE MEETING

3.1. Welcome address by the chair.

3.2. Previous Meeting Details.

3.3. Details of choice based credit system.

3.4. Discussion and Distribution of Common Core Syllabus for semester V and VI

3.5. Marks allotted for internal and end semester exams.

3.6. Discussion on Pattern and model paper of Semester Exam and internal exam for Semester V (Paper V & VI) ,Semester VI(Paper VII & VIII), SEC(1 & 2), SEC(3 & 4) and GE(1 & 2).

3.7. Discussion on Practical exam model paper for Semester V (Paper V & VI) , Semester VI (Paper VII & VIII).

3.8. Panel of Examiners

3.9. Any other matter

4.0. Vote of Thanks

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BOARD OF STUDIES
Academic Year – 2018-19

Minutes of BOS Meeting

BOS meeting of the Department of Physics was held on Saturday 18th August 2018 at 11:00AM

The following members were present

Dr. G. Prasad	-	University Nominee
Dr. J. Siva Kumar	-	Head, Department of Physics, O.U., Hyd.
Smt, Dr. B. Sreedevi	-	Chairperson
Prof. M.V. Ramana Reddy	-	Member of BOS
Mrs. Kirana	-	Member of BOS
Dr. D. Sarala	-	Member of BOS

3.1 Welcome address by the chair

The chair welcomed the University Nominee, Chairperson BOS, O.U Department of Physics and Members of B.O.S.

3.2 Previous Meeting details

The CBCS system has been introduced by Osmania university from 2016-17.The Theory and practical syllabus of I & II and III & IV semester, question paper pattern for theory and practical, internal assessment pattern, practical examination scheme and panel of examiners were discussed and approved by all the BOS Members in previous BOS meeting.

3.3 Details of choice based credit system.

As per UGC guidelines CBCS system followed. Under which after passing the exam student will get the Grade in the Final Result. B.Sc III Year in V and VI semester 3 Credits are given for theory paper and 1 credit for giver for practical in each semester.

3.4 Discussion and Distribution of Common Core Syllabus for semester V and VI

i. Members were informed by the chair that Department of Physics, Hindi Mahavidyalaya is following common core syllabus prescribed by Osmania University for B.Sc. III Year, Semester V and VI.

ii. The syllabus comprises of 3 units each of core and elective. There are two electives (A & B) for each semester from which any one elective can be choosen.

iii. Committee recommended to offer both the electives this has resulted in the increase of the workload of the staff members. Therefore the BOS members have suggested to appoint one more faculty member.

Syllabus copy for both the semesters is enclosed.

Syllabus was approved by the Members of BOS.

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3.5 Marks allotted for Internal and end Semester exams.

1. Internal assessment is of 15 marks. In each Semester two internal assessments of 15 Marks will be conducted and an average of both the internal assessments will be added in the marks of theory exam.
2. Theory Question paper is of 60 marks.
3. Total allotted marks are 75 for each theory paper DSC/DSE (A&B).
4. Internal assessment is of 10 marks for SEC & GE. One internal assessment of 10 Marks will be conducted and added in the marks of theory exam.
5. Theory Question paper for SEC & GE is of 40 marks.
6. Total allotted marks are 50 for each SEC & GE.

PAPER	Internal Exams	Theory QP Paper (External Exams)	Total Marks
SEC, GE	10	40	50
DSC/DSE (A&B)	15	60	75

The distribution of marks was approved by the Members of BOS.

3.6 Discussion on Pattern and Model Paper of Semester exam and Model Paper of Internal Exam

1. It was informed by the department that as per Osmania University CBCS guidelines there is no assignment for 3 credits core and elective papers. In each Semester Two Internal exams will be conducted for 15 marks. The internal assessment will have three sections.

   Section– A 10 Multiple choice questions, each carries ½ marks (10X½ = 5M)
   Section– B 10 Fill in the blanks, each carries ½ marks (10X ½ = 5M) and
   Section– C 05 short notes, each 1mark (5X1=5)

   Average of marks of these two internal exams will be taken.

2. Semester exam will be conducted as per the Almanac which will be provided by the exam branch. Internal exam duration will be 30Mnts and Semester exam duration will be of 3 hrs.

3. Model Question paper for Semester V and Semester VI was discussed. Theory paper for each Semester will have 2 sections.
   (i) Section A contains 8 short Questions. The student has to answer five questions. Each Question carries 3 Marks (5X3=15 Marks).
   (ii) Section B contains 3 Essay type Questions with internal choice. Each Question carries 15 Marks (3X15=45 Marks).

4. Model Question paper for SEC &GE Semester V and Semester VI was discussed. Theory paper for each SEC & GE will have 2 sections.
   (i) Section A contains 2 short Questions. The student has to answer TWO questions. Each Question carries 5 Marks (2X5=10 Marks)
   (ii) Section B contains 2 Essay type Questions with internal choice. Each Question carries 15 Marks (2X15=30 Marks)

- Pattern of Model Theory Question Papers for DSC (V &VII), DSE (VI & VIII A/B), and SEC Paper 3 and Paper 4 &GE are approved.

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3.7 Discussion on Practical Exam Model paper.

- The practical examination held for B.Sc III year (semester V&VI) will have the pattern of 50 marks and the credit will be 1. The duration of the exam will be 3 hrs.
- The Practical model paper of Sem III & IV, Sem V (Paper V & VI) and Sem VI(Paper VII & VIII) was approved by the Member of BOS.

3.8 Panel of Examiners

The panel of examiners was approved by the members.
The existing panel is approved by the members, however Chairman, BOARD OF STUDIES has authorized to update the panel as and when required.
List is enclosed

3.9 Any other matter.

1. The syllabus for the batch (2018-2021) is also approved by the members.

2. It is resolved to follow from 2017-2018 batch that the practical examinations held for B.Sc. II Years and III Years will have the pattern of 25 marks scheme and the credits will remain the same i.e. 1 credit. The duration of the exam will be 2 hours.

3.10 Vote of Thanks

Meeting concluded with the Vote of Thanks by Dr. B. Sreedevi.

Chairperson **University Nominee** **Members** **Principal**

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2018-19 CBCS STRUCTURE

SCHEME OF INSTRUCTIONS & EVALUATIONS

B.SC. M P CS

THIRD YEAR SEMESTER-V					Semester End exam		Continuous Internal Evaluation		Total	Practical 3 HRS
Code	Course Title	Course Type	HPW	Credits	Duration in HRS	Marks	Exam Duration	Marks		
BS501	ELECTRICAL CIRCUITS AND NETWORK SKILLS	SEC-3	2	2	2	40	30 min	10	50	-
BS502	WAVES AND OPTICS	GE-1	2 T	2	2	40	30 min	10	50	-
BS503	MATHEMATICS - V	DSC-1E	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
BS504	ELECTROMAGNETISM ✓	DSC-2E	3 T + 3P = 6	3+1=4	3	60	30 min	15	75	50
BS505	COMPUTER SCIENCE - V	DSC-3E	3 T + 2P = 5	3+1=4	3	60	30 min	20	75	50
BS506	MATHEMATICS - VI	DSE- 1E	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
BS507	ELECTIVE-1: A: SOLID STATE PHYSICS ✓ B: QUANTUM MECHANICS AND APPLICATIONS	DSE-2E	3 T + 3P = 6	3+1=4	3	60	30 min	15	75	50
BS508	COMPUTER SCIENCE - VI	DSE-3E	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
		TOTAL	36	28		440		115	850	

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B.SC. III YEAR PHYSICS
SEMESTER – V
(SEC-III)

ELECTRICAL CIRCUITS AND NETWORK SKILLS

Code: BS501 **Credits: 2**
HPW: 2 **Total Teaching Hours=30**

Objective: *The aim of this course is to enable the students to design and trouble shoots the electrical circuits, networks and appliances through hands-on mode*

Unit – I: **(15 Hrs)**

Basic Electricity Principles: Voltage, Current, Resistance, and Power. Ohm's law. Series, parallel, and series-parallel combinations. AC Electricity and DC Electricity. Familiarization with multimeter, voltmeter and ammeter.

Understanding Electrical Circuits: Main electric circuit elements and their combination. Rules to analyze DC sourced electrical circuits. Current and voltage drop across the DC circuit elements. Single-phase and three-phase alternating current sources. Rules to analyze AC sourced electrical circuits. Real, imaginary and complex power components of AC source. Power factor. Saving energy and money.

Electrical Drawing and Symbols: Drawing symbols. Blueprints. Reading Schematics. Ladder diagrams. Electrical Schematics. Power circuits. Control circuits. Reading of circuit schematics. Tracking the connections of elements and identify current flow and voltage drop.

Generators and Transformers: DC Power sources. AC/DC generators. Inductance, capacitance, and impedance. Operation of transformers.

Unit – II: **(15 Hrs)**

Electric Motors: Single-phase, three-phase & DC motors. Basic design. Interfacing DC or AC sources to control heaters & motors. Speed & power of ac motor.

Solid-State Devices: Resistors, inductors and capacitors. Diode and rectifiers. Components in Series or in shunt. Response of inductors and capacitors with DC or AC sources

Electrical Protection: Relays. Fuses and disconnect switches. Circuit breakers. Overload devices. Ground-fault protection. Grounding and isolating Phase reversal. Surge protection. Interfacing DC or AC sources to control elements (relay protection device)

Electrical Wiring: Different types of conductors and cables. Basics of wiring-Star and delta connection. Voltage drop and losses across cables and conductors. Instruments to measure current, voltage, power in DC and AC circuits. Insulation. Solid and stranded cable. Conduit. Cable trays. Splices: wirenuts, crimps, terminal blocks, split bolts, and solder. Preparation of extension board.

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References:

1. A text book in Electrical Technology - B L Theraja - S Chand & Co.
2. A text book of Electrical Technology - A K Theraja
3. Performance and design of AC machines - M G Say ELBS Edn.

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B.SC. III YEAR PHYSICS
SEMESTER – V
(GE-I)

WAVES AND OPTICS

Credits: 2
Total Teaching Hours=30

Code: BS502
HPW: 2

Objective: To know the basic nature of light and its effects.

(15 Lectures)

UNIT-I: WAVES

Superposition of Collinear Harmonic oscillations: Linearity and Superposition Principle. Superposition of two collinear oscillations having (1) equal frequencies and different frequencies (Beats).

Superposition of two perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses.

Wave Motion: General: Transverse waves on a string. Travelling and standing waves on a string. Normal Modes of a string.Group velocity, Phase velocity, Plane waves, Spherical waves, Wave intensity.

Sound: Simple harmonic motion-forced vibration and resonance-Fourier's Theorem. Application to saw tooth wave and square wave-Intensity and loudness of sound-Decibels-Intensity Levels-Musical notes-musical scale.

Acoustics of buildings: Reverberation and time of reverberation- Absorption coefficient-Sabine's formula-measurement of reverberation time-Acoustic aspects of halls and auditoria.

(15 Lectures)

UNIT-II: OPTICS

Wave Optics: Electromagnetic nature of light. Definition and properties of wave front. Huygens Principle. Temporal and Spatial Coherence.

Interference: Division of amplitude and wave front. Young's double slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index.

Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2)Determination of Wavelength, (3) Wavelength Difference (4) Refractive Index, and (5) Visibility of Fringes.

Fraunhofer diffraction: Single slit. Elementary idea of Diffraction grating.

Fresnel Diffraction: Half period zones, Zone Plate. Fresnel Diffraction pattern of a straight edge using half-period zone analysis.

Polarization: Transverse nature of light waves, Plane polarized light-production and analysis. Circular and elliptical polarization.

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References:

1. Fundamentals of Optics, F.A. Jenkins and H.E. White, 1976, McGraw-Hill
2. Principles of Optics, B.K. Mathur, 1995 , Gopal Printing
3. Fundamentals of Optics, H.R.Gulati and D.R. Khanna, 1991, R Chand Publications
4. University Physics, F.W. Sears, M.W. Zemansky and H.D. Young 13/e 1986, Addison-Wesley

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B.SC. III YEAR SEMESTER – V

SEC-III & GE-I - THEORY MODEL PAPER

TIME: 2 HOURS **MAX MARKS: 40**

SECTION-A

Answer the following Questions in short: **2 x 5 =10 marks**

1. UNIT - I
2. UNIT - II

SECTION-B

Answer the following essay type questions: **2 x 15 = 30 marks**

1 (a) UNIT – I OR (b) UNIT - I
2 (a) UNIT – II OR (b) UNIT - II

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B.SC. III YEAR SEMESTER – V

SEC-III & GE-I - INTERNAL MODEL PAPER

TIME: ½ HOUR **MAX MARKS: 10**

SECTION-A

FILL IN THE BLANKS: **10 x ½ =5 marks**

TEN (10) FIB ½ MARK EACH

SECTION-B

MULTIPLE CHOICE QUESTIONS **10 x ½ =5 marks**

TEN (10) MCQ ½ MARK EACH

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B.SC. III YEAR PHYSICS
SEMESTER – V PAPER-V
(DSE-COMPULSORY)

ELECTROMAGNETISM

Code: BS504
HPW: 3

Credits:3
Total Teaching Hours=45

Objective: To study the electric & magnetic fields thereby knowing about electromagnetic waves.

UNIT-I - Electrostatics **(15 hrs)**

Electric Field:- Concept of electric field lines and electric flux, Gauss"s law (Integral and differential forms), application to linear, plane and spherical charge distributions. Conservative nature of electric field E, irrotational field. Electric Potential:- Concept of electric potential, relation between electric potential and electric field, potential energy of a system of charges. Energy density in an electric field. Calculation of potential from electric field for a spherical charge distribution.

UNIT-II - Magneto statics **(15 hrs)**

Concept of magnetic field B and magnetic flux, Biot-Savart's law, B due to a straight current carrying conductor. Force on a point charge in a magnetic field. Properties of B, curl and divergence of B, solenoid field. Integral form of Ampere's law, applications of Ampere's law: field due to straight, circular and solenoid currents. Energy stored in magnetic field. Magnetic energy in terms of current and inductance. Magnetic force between two current carrying conductors. Magnetic field intensity. Ballistic Galvanometer:- Torque on a current loop in a uniform magnetic field, working principle of B.G., current and charge sensitivity, electromagnetic damping, critical damping resistance.

UNIT-III - Electromagnetic Induction **(15 hrs)**

Faraday's laws of induction (differential and integral form), Lenz's law, self and mutual Induction. Continuity equation, modification of Ampere's law, displacement current, Maxwell equations. Maxwell's equations in vacuum and dielectric medium, boundary conditions, plane wave equation: transverse nature of EM waves, velocity of light in vacuum and in medium, polarization, reflection and transmission. Polarization of EM waves, Brewster's angle, description of linear, circular and elliptical polarization.

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References:

1. Electricity and magnetism By Edward M. Purcell (McGraw-Hill Education, 1986)
2. Electricity and magnetism. By D C Tayal (Himalaya Publishing House,1988)
3. Electromagnetics by Joseph A.Edminister 2nd ed.(New Delhi Tata Mc Graw Hill, 2006)

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SEMESTER – V PAPER-V
(DSE-COMPULSORY)
PRACTICALS

ELECTROMAGNETISM

Credits: 1

Code: BS504P
HPW: 3

Total Teaching Hours=45

1. To verify the Thevenin Theorem
2. To verify Norton Theorem
3. To verify Superposition Theorem
4. To verify maximum power transfer theorem.
5. To determine a small resistance by Carey Foster's bridge.
6. To determine the (a) current sensitivity, (b) charge sensitivity, and (c) CDR of a B.G.
7. To determine high resistance by leakage method.
8. To determine the ratio of two capacitances by De Sauty's bridge.
9. To determine self-inductance of a coil by Anderson's bridge using AC.
10. To determine self-inductance of a coil by Rayleigh's method.
11. To determine coefficient of Mutual inductance by absolute method.

Note. Minimum of eight experiments should be performed. Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

References:

1. B. L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House, New Delhi.
2. Indu Prakash and Ramakrishna, A Text Book of Practical Physics, Kitab Mahal

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SEMESTER – V PAPER-V
(DSE-COMPULSORY)
ELECTROMAGNETISM

Theory Model Question Paper

Time - 3 Hrs **Max Marks: 60**

SECTION - A

Note: Short Answer Questions

I Attempt any five of the following: **5X3=15 Marks**

1. Question from unit I
2. Question from unit I
3. Question from unit II
4. Question from unit II
5. Question from unit III
6. Question from unit III
7. Question from any of the three units
8. Question from any of the three units

SECTION – B

Note: Long Answers Questions:
II Answer all the questions with internal choice. **3X15=45 Marks**

9. a) Question from unit I OR b) Question from unit I

10. a) Question from unit II OR b) Question from unit II

11. a) Question from unit III OR b) Question from unit III

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SEMESTER – V PAPER-V
(DSE-COMPULSORY)
ELECTROMAGNETISM

PRACTICAL MODEL QUESTION PAPER

Time - 3 Hrs | Max Marks: 50

I. One Question from Question Bank — 30 Marks

II. Record — 10 Marks

III. Vivavoce — 10 Marks

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B.SC. III YEAR PHYSICS
SEMESTER – V PAPER-VI
(DSE- ELECTIVE-I)
SOLID STATE PHYSICS (A)

Credits: 3

Code: BS507
HPW: 3

Total Teaching Hours=45

Objective: To study about basic physical structures & theories leading to applications in various fields.

UNIT-I **(15hrs)**

Crystal Structure: Solids: Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis – Central and Non-Central Elements. Unit Cell. Miller Indices. Types of Lattices, Reciprocal Lattice. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's Law. Atomic and Geometrical Factor.

Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids. T3 law

UNIT-II **(15 hrs)**

Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia–and Paramagnetic Domains. Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss.

Dielectric Properties of Materials: Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mosotti Equation. Classical Theory of Electric Polarizability.

UNIT-III **(15 hrs)**

Elementary band theory: Kronig Penny model. Band Gap. Brillouin zones, effective mass of electron. Conductor, Semiconductor (P and N type) and insulator. Conductivity of Semiconductor, mobility, Hall Effect, Electric Conductivity by four probe method & Hall coefficient. Lasers: Einstein's A and B coefficients. Metastable states. Spontaneous and Stimulated emissions. Optical Pumping and Population Inversion. Three-Level and Four-Level Lasers. Ruby Laser and He-Ne Laser. Superconductivity: Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect. Idea of BCS theory. D.C and A.C Josepson effects.

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References:

1. Introduction to Solid State Physics, Charles Kittel, 8th Edition, 2004, Wiley India Pvt. Ltd.
2. Elements of Solid State Physics, J.P. Srivastava, 2nd Edition, 2006, Prentice-Hall of India
3. Introduction to Solids, Leonid V. Azaroff, 2004, Tata Mc-Graw Hill
4. Solid State Physics, N.W. Ashcroft and N.D. Mermin, 1976, Cengage Learning
5. Solid State Physics- R.K.Puri &V.K. Babbar (S.Chand Publication)2013
6. Lasers and Non linear Optics –B.B.Laud-Wiley Eastern.
7. LASERS: Fundamentals and Applications – Thyagarajan and Ghatak (McMillanIndia)

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B.SC. III YEAR PHYSICS
SEMESTER -- V PAPER-VI
(DSE- ELECTIVE-I)
PRACTICALS

SOLID STATE PHYSICS (A)

Code: BS507P **Credits: 1**
HPW: 3 **Total Teaching Hours=45**

1. Measurement of susceptibility of paramagnetic solution (Quinck's Tube Method)
2. To measure the Magnetic susceptibility of Solids.
3. To determine the Coupling Coefficient of a Piezoelectric crystal.
4. To measure the Dielectric Constant of a dielectric Materials with frequency
5. To study the PE Hysteresis loop of a Ferroelectric Crystal.
6. To draw the BH curve of Fe using Solenoid & determine energy loss from Hysteresis.
7. To measure the resistivity of a semiconductor (Ge) with temperature by four-probe method (room temperature to 150^0 C) and to determine its band gap.
8. To determine the Hall coefficient of a semiconductor sample.
9. Calculation of d-values of a given Laue's pattern.
10. Calculation of d-values of powder diffraction method.
12. To study the spectral characteristics of a Photo- Voltaic cell.
13. Verification of Bragg's equation.

Note: Minimum Six experiments should be performed. Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

References:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
3. A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal
4. Elements of Solid State Physics, J.P. Srivastava, 2nd Ed., 2006, Prentice-Hall of India

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SEMESTER – V PAPER-VI
(DSE- ELECTIVE-I)
QUANTUM MECHANICS AND APPLICATIONS (B)

Code: BS507 **Credits: 3**
HPW: 3 **Total Teaching Hours=45**

Objective: To study about the Quantum Mechanical Approach to physical systems.

UNIT-I **(15 hrs)**

Schrodinger equation & the operators: Time dependent Schrodinger equation and dynamical evolution of a quantum state; Properties of Wave Function. Interpretation of Wave Function Probability and probability current densities in three dimensions; Conditions for Physical Acceptability of Wave Functions. Normalization. Linearity and Superposition Principles. Hermitian operator, Eigen values and Eigen functions. Position, momentum and Energy operators; commutator of position and momentum operators; Expectation values of position and momentum. Wave Function of a Free Particle. Time independent Schrodinger equation-Hamiltonian, stationary states and energy eigen values; expansion of an arbitrary wave function as a linear combination of energy eigen functions;

UNIT-II **(15 hrs)**

General solution of the time dependent Schrodinger equation in terms of linear combinations of stationary states; Application to spread of Gaussian wave-packet for a free particle in one dimension; wave packets, Fourier transforms and momentum space wave function; Position-momentum uncertainty principle.

General discussion of bound states in an arbitrary potential- continuity of wave function, boundary condition and emergence of discrete energy levels; application to one-dimensional problem-square well potential; Quantum mechanics of simple harmonic oscillator-energy levels and energy eigen functions ground state, zero point energy & uncertainty principle. One dimensional infinitely rigid box-energy eigen values and eigen functions, normalization;

UNIT-III **(15 hrs)**

Quantum dot as example; Quantum mechanical scattering and tunnelling in one dimension across a step potential & rectangular potential barrier.

Atoms in Electric & Magnetic Fields: Electron angular momentum. Space quantization. Electron Spin and Angular Momentum. Larmor"s Theorem. Spin Magnetic Moment. SternGerlach Experiment. Zeeman Effect: Electron Magnetic Moment and Magnetic Energy, Gyromagnetic Ratio aand Bohr Magneton. Atoms in External Magnetic Fields:- Normal and Anomalous Zeeman Effect. Paschen Back and Stark Effect (Qualitative Discussion only).

References:

1. Quantum Mechanics, G. Aruldhas, 2nd Edn. 2002, PHI Learning of India Cohen-Tannoudji, B Diu and F Laloë,
2. Quantum Mechanics (2 vols) Wiley- VCH 1977 • Basic Quantum Mechanics –A Ghatak (Mc Millan India) 2012
3. Introduction to Quantum Mechanics, D J. Griffith, 2nd Ed. 2005, Pearson • Quantum Physics S. Gasiorowicz (Wiley India) 2013

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SEMESTER – V PAPER-VI
(DSE - ELECTIVE-I)
PRACTICALS

QUANTUM MECHANICS AND APPLICATIONS (B)

Code: BS507P **Credits: 1**
HPW: 3 **Total Teaching Hours=45**

Use C/C++/Scilab for solving the following problems based on Quantum Mechanics like

1. Solve the s-wave Schrodinger equation for the ground state and the first excited state of the hydrogen atom: Here, m is the reduced mass of the electron. Obtain the energy eigen values and plot the corresponding wave functions. Remember that the ground state energy of the hydrogen atom is = -13.6 eV. Take e = 3.795 (eVÅ)1/2, ħc = 1973 (eVÅ) and m = 0.511x106 eV/c2.
2. Solve the s-wave radial Schrodinger equation for an atom: where m is the reduced mass of the system (which can be chosen to be the mass of an electron), for the screened coulomb potential Find the energy (in eV) of the ground state of the atom to an accuracy of three significant digits. Also, plot the corresponding wave function. Take e = 3.795 (eVÅ)1/2, m = 0.511x106 eV/c2, and a = 3 Å, 5 Å, 7 Å. In these units ħc = 1973 (eVÅ). The ground state energy is expected to be above -12 eV in all three cases.
3. Solve the s-wave radial Schrodinger equation for a particle of mass m: For the an harmonic oscillator potential for the ground state energy (in MeV) of particle to an accuracy of three significant digits. Also, plot the corresponding wave function. Choose m = 940 MeV/c2, k = 100 MeV fm-2, b = 0, 10, 30 MeV fm-3In these units, cħ = 197.3 MeV fm. The ground state energy I expected to lie between 90 and 110 MeV for all three cases.
4. Solve the s-wave radial Schrodinger equation for the vibrations of hydrogen molecule: Where μ is the reduced mass of the two-atom system for the Morse potential Find the lowest vibrational energy (in MeV) of the molecule to an accuracy of three significant digits. Also plot the corresponding wave function. Take: m = 940x106eV/C2, D = 0.755501 eV, α = 1.44, ro = 0.131349 Å

Laboratory based experiments:

5. Study of Electron spin resonance- determine magnetic field as a function of the resonance frequency
6. Study of Zeeman effect: with external magnetic field; Hyperfine splitting
7. To show the tunneling effect in tunnel diode using I-V characteristics.
8. Quantum efficiency of CCDs

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References:

1. Schaum's outline of Programming with C++. J.Hubbard, 2000,McGraw-Hill Publication
2. Numerical Recipes in C: The Art of Scientific Computing, W.H. Pressetal., 3rd Edn., 2007, Cambridge University Press.
3. An introduction to computational Physics, T.Pang, 2nd Edn.,2006, Cambridge Univ. Press • Simulation of ODE/PDE Models with MATLAB®, OCTAVE and SCILAB: Scientific & Engineering Applications: A. Vande Wouwer, P. Saucez, C. V. Fernández.2014 Springer.
4. Scilab (A Free Software to Matlab): H. Ramchandran, A.S. Nair. 2011 S. Chand & Co.
5. Scilab Image Processing: L.M.Surhone.2010 Betascript Publishing ISBN:978-613345927

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B.SC. III YEAR PHYSICS
SEMESTER – V PAPER-VI
(DSE- ELECTIVE-I – A & B)

Theory Model Question Paper

Time - 3 Hrs **Max Marks: 60**

SECTION - A

Note: Short Answer Questions

I Attempt any five of the following: **5X3=15 Marks**

1. Question from unit I
2. Question from unit I
3. Question from unit II
4. Question from unit II
5. Question from unit III
6. Question from unit III
7. Question from any of the three units
8. Question from any of the three units

SECTION – B

Note: Long Answers Questions:

II Answer all the questions with internal choice. **3X15=45 Marks**

9. a) Question from unit I OR b) Question from unit I

10. a) Question from unit II OR b) Question from unit II

11. a) Question from unit III OR b) Question from unit III

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(DSE- ELECTIVE-I – A & B)

PRACTICAL MODEL QUESTION PAPER

Max Marks: 50

Time - 3 Hrs

I. One Question from Question Bank — 30 Marks

II. Record — 10 Marks

III. Viva voce — 10 Marks

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2018-19 CBCS STRUCTURE

SCHEME OF INSTRUCTIONS & EVALUATIONS

B.SC. M P CS

THIRD YEAR SEMESTER-VI

Code	Course Title	Course Type	HPW	Credits	Semester End exam		Continuous Internal Evaluation		Total	Practical 3 HRS
					Duration in HRS	Marks	Exam Duration	Marks		
BS601	BASIC INSTRUMENTATION SKILLS	SEC-4	2	2	2	40	30 min	10	50	-
BS602	ELECTRICITY AND MAGNETISM AND EMT	GE-2	2	2	2	40	30 min	10	50	-
BS603	MATHEMATICS - VII	DSC-1F	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
BS604	MORDERN PHYSICS	DSC-2F	3 T + 3P = 6	3+1=4	3	60	30 min	15	75	50
BS605	COMPUTER SCIENCE - VII	DSC-3F	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
BS606	MATHEMATICS - VIII	DSE- 1F	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
BS607	ELECTIVE-II: (A) BASIC ELECTRONICS B: PHYSICS OF SEMICONDUCTOR DEVICES	DSE-2F	3 T + 3P = 6	3+1=4	3	60	30 min	15	75	50
BS608	COMPUTER SCIENCE - VIII	DSE-3F	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	50
		TOTAL	36	28		440		110	850	
		TOTAL CREDITS		56						

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B.SC. III YEAR PHYSICS
SEMESTER – VI
(SEC-IV)
BASIC INSTRUMENTATION SKILLS

Credits: 2
Code:BS601
Total Teaching Hours=30
HPW: 2

Objective: *This course is to get exposure with various aspects of instruments and their usage through hands-on mode.*

(15 Hrs)

Unit-I:

Basic of Measurement: Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects. **Multimeter:** Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance.

Electronic Voltmeter: Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage, measurement (block diagram only). Specifications of an electronic Voltmeter/ Multimeter and their significance. **AC millivoltmeter:** Type of AC millivoltmeters: Amplifier- rectifier, and rectifier- amplifier. Block diagram ac millivoltmeter, specifications and their significance.

Cathode Ray **Oscilloscope:** Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only– no mathematical treatment), brief discussion on screen phosphor, visual persistence & chemical composition. Time base operation, synchronization. Front panel controls. Specifications of a CRO and their significance.

Use of CRO for the measurement of voltage (dc and ac frequency, time period. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope: Block diagram and principle of working.

(15 Hrs)

Unit–II:

Signal Generators and Analysis Instruments: Block diagram, explanation and specifications of low frequency signal generators, pulse generator, and function generator. Brief idea for testing, specifications. Distortion factor meter, wave analysis.

Impedance Bridges & Q-Meters: Block diagram of bridge, working principles of basic (balancing type) RLC bridge. Specifications of RLC bridge. Block diagram & working principles of a Q-Meter. Digital LCR bridges

Digital Instruments: Principle and working of digital meters. Comparison of analog & digital instruments. Characteristics of a digital meter. Working principles of digital voltmeter.

Digital Multimeter: Block diagram and working of a digital multimeter. Working principle of time interval, frequency and period measurement using universal counter/ frequency counter, time-base stability, accuracy and resolution.

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References:

1. A text book in Electrical Technology - B L Theraja - S Chand and Co
2. Performance and design of AC machines - M G Say ELBS Edn.
3. Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill
4. Logic circuit design, Shimon P. Vingron, 2012, Springer
5. Digital Electronics, Subrata Ghoshal, 2012, Cengage Learning
6. Electronic Devices and circuits, S. Salivahanan & N. S Kumar, 3rd Ed., 2012, Tata Mc-Graw Hill
7. Electronic circuits: Handbook of design and applications, U Tietze, Ch Schenk, 2008, Springer
8. Electronic Devices, 7/e Thomas L. Floyd, 2008, Pearson India

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SEMESTER – VI
(GE II)

ELECTRICITY AND MAGNETISM AND EMT

Code: BS602
HPW: 2

Credits: 2
Total Teaching Hours=30

Objective: *This course is to get exposure with various aspects of electromagnetic fields and their usage through hands-on mode*

UNIT-I **(15 Lectures)**

Electrostatics: Electrostatics field, electric flux, Gauss's theorem of electrostatics, Applications of Gauss theorem Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, place charged sheet, charged conductor. Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere. Calculation of electric field from potential

Capacitance: Capacitance of an isolated spherical conductor. Parallel plate, Spherical and cylindrical condenser. Enery per unit volume in electrostatic field. Dielectric medium, Polarisation Displacement vector, Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric.

UNIT-II **(15 Lectures)**

Magnetism: Magnetostatics – Biot-Savart's law and its applications-straight conductor, circular coil, solenoid carrying current. Divergence and curl of magnetic field. Magnetic vector potential. Ampere's circuital law. Magnetic properties of materials. Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. Brief introduction of dia-para and ferromagnetic materials

Electromagnetic Induction : Faraday's law of electromagnetic induction, Lenz's law, self and mutual inductance. L of single coil, M of two coils Energy stored in magnetic field

Maxwell's equations and Electromagnetic wave propagation : Equation of continuity of current, Displacement current. Maxwell's equations, Poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic dielectric medium, transverse nature of EM waves, polarization

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References:

1. Electricity and Magnetism Edward M. Purcell, 1986, McGraw-Hill Education
2. Electricity & Magnetism, J.H. Fewkes & J. Yarwood. Vol. 1, 1991, Oxford Univ. Press
3. Electricity and Magnetism, D.C. Tayal, 1998, Himalaya Publishing House.
4. University Physics, Ronald Iane Reese, 2003 Thomson Brooks/Cole.
5. D.J. Griffiths, introduction to Electrodynamics, 3rd Edn,1998, Benjamin Cummings.
6. Electricity and Magnetism, K.K. Tewari (S. Chand Higher Academics) 2013

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B.SC. III YEAR SEMESTER – VI

SEC-IV & GE-II - THEORY MODEL PAPER

TIME: 2 HOURS **MAX MARKS: 40**

SECTION-A

Answer the following Questions in short: **2 x 5 =10 marks**

1. UNIT - I
2. UNIT - II

SECTION-B

Answer the following essay type questions: **2 x 15 = 30 marks**

1 (a) UNIT – I OR (b) UNIT - I
2 (a) UNIT – II OR (b) UNIT - II

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B.SC. III YEAR SEMESTER – VI

SEC-IV & GE-II - INTERNAL MODEL PAPER

TIME: ½ HOUR **MAX MARKS: 10**

SECTION-A

FILL IN THE BLANKS: **10 x ½ =5 marks**

TEN (10) FIB ½ MARK EACH

SECTION-B

MULTIPLE CHOICE QUESTIONS **10 x ½ =5 marks**

TEN (10) MCQ ½ MARK EACH

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B.SC. III YEAR PHYSICS
SEMESTER – VI PAPER-VII
(DSC- Compulsory)
MODERN PHYSICS

Code: BS604 **Credits:3**
HPW: 3 **Total Teaching Hours=45**

Objective: To study basic principles of modern physics & its applications

UNIT-I **(15hrs)**

Atomic Spectra and Models Inadequacy of classical physics:
Brief Review of Black body Radiation , Photoelectric effect, Compton effect, dual nature of radiation, wave nature of particles. Atomic spectra, Line spectra of hydrogen atom, Ritz Rydberg combination principle. Alpha Particle Scattering, Rutherford Scattering Formula, Rutherford Model of atom and its limitations, Bohr's model of H atom, explanation of atomic spectra, correction for finite mass of the nucleus, Bohr correspondence principle, limitations of Bohr model, discrete energy exchange by atom, Frank Hertz Expt. Sommerfeld's Modification of Bohr's Theory.

UNIT-II **(15hrs)**

Wave Particle Duality de Broglie hypothesis, Experimental confirmation of matter wave, Davisson Germer Experiment, velocity of de Broglie wave, wave particle duality, Complementarity. Superposition of two waves, phase velocity and group velocity , wave packets, Gaussian Wave Packet , spatial distribution of wave packet, Localization of wave packet in time. Time development of a wave Packet; Wave Particle Duality, Complementarity . Heisenberg Uncertainty Principle, Illustration of the Principle through thought Experiments of Gamma ray microscope and electron diffraction through a slit. Time independent and time dependent Schrodinger wave equation. Estimation of ground state energy of harmonic oscillator and hydrogen atom, non-existence of electron in the nucleus. Uncertainty and Complementarities.

UNIT-III **(15 hrs)**

Nuclear Physics Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, Liquid Drop model: semi-empirical mass formula and binding energy, Nuclear Shell Model and magic numbers. Radioactivity: stability of the nucleus; Law of radioactive decay; Mean life and half-life, Alpha decay, Beta decay- energy released, spectrum and Pauli's prediction of neutrino; Gamma ray emission, energy-momentum conservation: electron-position pair creation by gamma photons in the vicinity oof a nucleus. Fission and fusion- mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions driving stellar energy (brief qualitative discussions). Classification of Elementary Particles.

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References:

1. Modern Physics – Bernstein, Fishbane and Gasiorowicz (Pearson India) 2010
2. Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles -- R. Eisberg (Wiley India) 2012 Additional Books for Reference
3. Modern Physics, J.R. Taylor, C.D. Zafiratos, M.A. Dubson, 2004, PHI Learning.
4. Theory and Problems of Modern Physics, Schaum's outline, R. Gautreau and W. Savin, 2nd Edn, Tata McGraw-Hill Publishing Co. Ltd.
5. Quantum Physics, Berkeley Physics, Vol.4. E.H.Wichman, 1971, Tata McGraw-Hill Co.
6. Basic ideas and concepts in Nuclear Physics, K.Heyde, 3rd Edn., Institute of Physics Pub.
7. Six Ideas that Shaped Physics: Particle Behave like Waves, T.A.Moore, 2003, McGraw Hill
8. Modern Physics-Serway (CENGAGE Learnings) 2014
9. Physics of Atoms and Molecules – Bransden (Pearson India) 2003

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B.SC. III YEAR PHYSICS
SEMESTER – VI PAPER-VII
(DSC- Compulsory)
PRACTICALS
MODERN PHYSICS

Credits: 1

Code: BS604P
HPW: 3

Total Teaching Hours=45

1. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light
2. To determine the Planck's constant using LEDs of at least 4 different colors.
3. To determine the ionization potential of mercury.
4. To determine the absorption lines in the rotational spectrum of Iodine vapour.
5. To determine the value of e/m by (a) Magnetic focusing or (b) Bar magnet.
6. To show the tunneling effect in tunnel diode using I-V characteristics.
7. To determine the wavelength of laser source using diffraction of single slit.
8. To determine the wavelength of laser source using diffraction of double slits.
9. To determine (1) wavelength and (2) angular spread of He-Ne laser using plane diffraction grating
10. To determine the value of e/m for electron by long solenoid method.
11. Photo Cell – Determination of Planck's constant.
12. To verify the inverse square law of radiation using a photo-electric cell.
13. To find the value of photo electric work function of a material of the cathode using a photo-electric cell.
14. G. M. Counter – Absorption coefficients of a material.

Note: Minimum Six experiments should be performed. Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

References:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers

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References:

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2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers

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(DSC- Compulsory)
MODERN PHYSICS

Theory Model Question Paper

Time - 3 Hrs | Max Marks: 60

SECTION - A

Note: Short Answer Questions

I Attempt any five of the following: 5X3=15 Marks

1. Question from unit I
2. Question from unit I
3. Question from unit II
4. Question from unit II
5. Question from unit III
6. Question from unit III
7. Question from any of the three units
8. Question from any of the three units

SECTION – B

Note: Long Answers Questions:
II Answer all the questions with internal choice. 3X15=45 Marks

9. a) Question from unit I OR b) Question from unit I
10. a) Question from unit II OR b) Question from unit II
11. a) Question from unit III OR b) Question from unit III

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(DSC- Compulsory)
MODERN PHYSICS

PRACTICAL MODEL QUESTION PAPER

Time - 3 Hrs **Max Marks: 50**

I. One Question from Question Bank	30 Marks
II. Record	10 Marks
III. Vivavoce	10 Marks

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SEMESTER – VI PAPER-VIII
(DSE- Elective-II)

BASIC ELECTRONICS (A)

Code: BS607 **Credits: 3**
HPW: 3 **Total Teaching Hours=45**

Objective: To study about the basic electronics to understand the basic computer functioning

UNIT-I: **(15 hrs)**

Network Elements and Network Theorems

Passive elements, Power sources, Active Elements, Network Models: T and π Transformations, Superposition theorem, Thevenin's Theorem, Norton's theorem, Reciprocity Theorem and Maximum power transfer theorem (Simple problems). Two-port Networks – Introduction- Z-parameters, Y-parameters, h-parameters and ABCD- parameters (Simple problems).

UNIT – II: **(15 hrs)**

Band theory of P-N junction

1. Energy band in solids (band theory), valence band, conduction band and forbidden energy gap solids, Insulators, semi conductors and, pure or intrinsic semiconductors and impurity or extrinsic semi-conductors. N-type extrinsic semi-conductors, P-type extrinsic semi- conductors, Fermi level, continuity equation.
2. **Diodes:** P-N junction diode, Bridge rectifier, Zener diode & its Characteristics. Zener diode as voltage regulator.
3. **Bipolar Junction Transistor (BJT)** – p-n-p and n-p-n transistors, current components in transistors, CB, CE and CC configurations – transistor as an amplifier -RC coupled amplifier. (Qualitative analysis)

UNIT-III: **(15 hrs)**

1. **Feedback Concept & Oscillators:** Feedback, General theory of feedback–Concepts of a Oscillators, Barkhausen's criteria, Phase shift Oscillator.

2. **Digital Electronics -** Binary number system, converting Binary to Decimal and vice versa. Binary addition and subtraction (1s and 2s complement methods). Hexadecimal number system. Conversion from Binary to Hexadecimal – vice versa and Decimal to Hexadecimal vice versa.

3. **Logic gates -** OR, AND, NOT gates, truth tables, realization of these gates using discrete components. NAND, NOR as universal gates, Exclusive – OR gate (EX-OR). De Morgan's Laws – Statement and proof.

NOTE: Problems should be solved from every chapter of all units.

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References:

1. Basic Electronics – Bernod Grob.
2. Third year Electronics – Telugu Academy
3. Digital Principles & Applications – A.P. Malvino and D.P. Leach
4. Circuit theory- Umesh.

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PRACTICALS

BASIC ELECTRONICS (A)

Code: BSEIIP
HPW: 3

Credits: 1
Total Teaching Hours=45

I. AND, OR, NOT gates – Truth table Verification
2. AND, OR, NOT – gates constructions using universal gates – Verification of truth tables.
3. NAND and NOR gates truth table verification
4. Characteristics of a Transistor in CE configuration
5. Verification of De Morgan's Theorem.
6. Zener diode V-I characteristics.
7. Verification Thevenin's theorem.
8. Maximum Power Transfer theorem.
9. P-n junction diode V-I characteristics.
10. Zener diode as a voltage regulator

NOTE: Every student should complete minimum 06 experiments.

References:

I. B.Sc. Practical Physics – C. L. Arora – S. Chand & Co.
2. Viva-voce in Physics – R.C. Gupta, Pragathi Prakashan, Meerut.
3. Laboratory manual for Physics Course by B.P. Khandelwal.
4. Practical Physics by M. Arul Thalapathi by Comptex Publishers.
5. B.Sc. practical physics – Sucai Reddy

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SEMESTER – VI PAPER-VIII
(DSE- Elective-II)

PHYSICS OF SEMICONDUCTOR DEVICES (B)

Code: BS607 **Credits: 3**
HPW: 3 **Total Teaching Hours=45**

Objective: To study about semiconductor devices leading to their applications in software.

Unit-I: **(15 hrs)**

Semiconductor Physics: Conductors, Semiconductors, forbidden orbits, energy levels, crystals and covalent bonds, free electrons and holes, recombination and life-time, energy bands. Intrinsic Semiconductor- intrinsic carrier concentration, density of electrons in conduction band, fermi-level, mass action law. Carrier transport phenomena- mobility, resistivity, diffusivity, Einstein's relation, current density equation. Extrinsic semiconductor- n-type semiconductor, p-type semiconductor, energy band diagram of extrinsic semiconductor. Hall effect- mobility and Hall angle, experiment arrangement for the study of Hall effect, significance of Hall effect.

UNIT – II: **(15 hrs)**

P-N junction-Depletion layer, Energy level diagram of p-n junction, Band structure of an open circuited p-n junction, Biasing of p-n junction, effect of barrier potential on forward bias, reverse leakage current, reverse breakdown, P-n junction under various conditions- thermal equilibrium, forward and reverse bias, current-voltage characteristics. Derivation of ideal diode equation of p-n junction, diode model and its approximations. Forward and reverse resistance of diode. Dynamic characteristic of diode.

UNIT-III: **(15 hrs)**

Special diodes-Zener diode, Light –emitting diode (LED), Photo-diode, Schottky diode, Backward diodes and Tunnel diode.Transistors- Bipolar junction transistor (BJT), transistor characteristics, transistor equation in active region, field effect transistor (FET), Phototransistor and MOSFETTs.
Control devices- Shockley Diode, Silicon Controlled Rectifier (SCR), Silicon Controlled Switch (SCS), Unijunction transistor (UJT), Solar Cells, Opto-couplers.

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References:

1. A First Course in Electronics- Anwar A. Khan& Kanchan K. Dey, PHI
2. Physics of Semiconductor Devices- S. M. Sze
3. Physics of Semiconductors- Streetman

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(DSE- Elective-II)
PRACTICALS

PHYSICS OF SEMICONDUCTOR DEVICES (B)

Code: BS607P **Credits: 1**
HPW: 3 **Total Teaching Hours=45**

1. Characteristics of a Transistor in CE configuration
2. Zener diode V-I characteristics.
3. P-n junction diode V- I characteristics.
4. Zener diode as a voltage regulator
5. Thermistor characteristics
6. Efficiency of a LED
7. Solar cell: fill factor and efficiency
8. FET characteristics
9. SCR characteristics
10. UJT characteristics

NOTE: Every student should complete minimum 06 experiments.

References:
1. Basic electronics Grob
2. Practical Electronics Zbar

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(DSE- Elective-II – A & B)

Theory Model Question Paper

Time - 3 Hrs **Max Marks: 60**

SECTION - A

Note: Short Answer Questions

I. Attempt any five of the following: **5X3=15 Marks**

1. Question from unit I
2. Question from unit I
3. Question from unit II
4. Question from unit II
5. Question from unit III
6. Question from unit III
7. Question from any of the three units
8. Question from any of the three units

SECTION – B

Note: Long Answers Questions:

II. Answer all the questions with internal choice. **3X15=45 Marks**

9.	a) Question from unit I	OR	b) Question from unit I
10.	a) Question from unit II	OR	b) Question from unit II
11.	a) Question from unit III	OR	b) Question from unit III

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SEMESTER – VI PAPER-VIII
(DSE- Elective-II – A & B)

PRACTICAL MODEL QUESTION PAPER

Time - 3 Hrs **Max Marks: 50**

I. One Question from Question Bank	**30 Marks**
II. Record	**10 Marks**
III. Vivavoce	**10 Marks**

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SEMESTER – V & VI

INTERNAL EXAM MODEL PAPER

TIME: ½ HOUR **MAX MARKS: 15**

SECTION-A

I. MULTIPLE CHOICE QUESTIONS **10x ½ = 5 Marks**

TEN (10) MCQ ½ MARK EACH

SECTION-B

II. FILL IN THE BLANKS: **10 x ½ = 5 Marks**

TEN (10) FIB ½ MARK EACH

SECTION-C

III. SHORT NOTE QUESTIONS: **5 x 1 = 5 Marks**

FIVE (5) 1(ONE) MARK EACH

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SCHEME OF INSTRUCTIONS & EVALUATIONS

B.SC. M P CS / M S CS										
SECOND YEAR SEMESTER-III					Semester End exam		Continuous Internal Evaluation		Total	Practical 3 HRS
Code	Course Title	Course Type	HPW	Credits	Duration in HRS	Marks	Exam Duration	Marks		
BS301	A/B	SEC-1	2	2	2	40	30 min	10	50	-
BS302	English	CC-1C	5	5	3	80	30 min	20	100	-
BS303	Second Language	CC-2C	5	5	3	80	30 min	20	100	-
BS304	MATHS	DSC-1C	4 T + 2P = 6	4+1=5	3	80	30 min	20	100	25
BS305	PHYSICS / STATISTICS	DSC-2C	4 T + 2P = 6	4+1=5	3	80	30 min	20	100	25
BS306	COMPUTER SCIENCE	DSC-3C	4 T + 2P = 6	4+1=5	3	80	30 min	20	100	25
		TOTAL	30	27		440		110	625	

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2018-19 CBCS STRUCTURE

SCHEME OF INSTRUCTIONS & EVALUATIONS

B.SC. M P CS / M S CS										
SECOND YEAR SEMESTER-IV					Semester End exam		Continuous Internal Evaluation		Total	Practical 3 HRS
Code	Course Title	Course Type	HPW	Credits	Duration in HRS	Marks	Exam Duration	Marks		
BS401	C/D	SEC-2	2	2	2	40	30 min	10	50	-
BS402	English	CC -1D	5	5	3	80	30 min	20	100	-
BS403	Second Language	CC-2D	5	5	3	80	30 min	20	100	-
BS404	MATHS	DSC-1D	4 T + 2P = 6	4+1=5	3	80	30 min	20	100	25
BS405	PHYSICS / STATISTICS	DSC-2D	4 T + 2P = 6	4+1=5	3	80	30 min	20	100	25
BS406	COMPUTER SCIENCE	DSC-3D	4 T + 2P = 6	4+1=5	3	80	30 min	20	100	25
		TOTAL	30	27		440		110	625	
				TOTAL CREDITS	54					

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B.SC. II YEAR PHYSICS
SEMESTER – III
(SEC-I)

WEATHER FORECASTING

Code: BS301
HPW: 2

Credits: 2
Total Teaching Hours=30

Objective: *The aim of this course is not just to impart theoretical knowledge to the students but to enable them to develop an awareness and understanding regarding the causes and effects of different weather phenomenon and basic forecasting techniques*

Unit-I: **(15 Hrs)**

Introduction to atmosphere: Elementary idea of atmosphere: physical structure and composition; compositional layering of the atmosphere; variation of pressure and temperature with height; air temperature; requirements to measure air temperature; temperature sensors: types; atmospheric pressure: its measurement; cyclones and anticyclones: its characteristics.

Measuring the weather: Wind; forces acting to produce wind, wind speed direction: units, its direction; measuring wind speed and direction; humidity, clouds and rainfall, radiation: absorption, emission and scattering in atmosphere; radiation laws.

Weather systems: Global wind systems; air masses and fronts: classifications; jet streams; local thunderstorms; tropical cyclones: classification; tornadoes; hurricanes.

Unit-II: **(15 Hrs)**

Climate and Climate Change: Climate: its classification; causes of climate change; global warming and its outcomes; air pollution; aerosols, ozone depletion, acid rain, environmental issues related to climate.

Basics of weather forecasting: Weather forecasting: analysis and its historical background; need of measuring weather; types of weather forecasting; weather forecasting methods; criteria of choosing weather station; basics of choosing site and exposure; satellites observations in weather forecasting; weather maps; uncertainty and predictability; probability forecasts.

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References:

1. Aviation Meteorology, I C. Joshi, 3rd edition 2014, Himalayan Books
2. The weather Observers Hand book, Stephen Burt, 2012, Cambridge University Press
3. Meteorology, S R Ghadekar, 2001, Agromet Publishers, Nagpur
4. Text Book of Agrometeorology, S.R. Ghadekar, 2005, Agromet Publishers, Nagpur.
5. Why the weather, Charls Franklin Brooks, 1924, Chpraman & Hall, London.
   Atmosphere and Ocean, John G. Harvey, 1995, The Artemis Press

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SEMESTER – IV
(SEC-II)

RENEWABLE ENERGY AND ENERGY HARVESTING

Code: BS401
HPW: 2

Credits: 2
Total Teaching Hours=30

Obejctive: *The aim of this course is not just to impart theoretical knowledge to the students but to provide them with exposure and hands-on learning wherever possible*

Unit-I: **(15 Hrs)**

Fossil fuels and Alternate Sources of energy: Fossil fuels and Nuclear Energy, their limitation, need of renewable energy, non-conventional energy sources. An overview of developments in Offshore Wind Energy, Tidal Energy, Wave energy systems, Ocean Thermal Energy Conversion, solar energy, biomass, biochemical conversion, biogas generation, geothermal energy tidal energy, Hydroelectricity.

Solar energy: Solar energy, its importance, storage of solar energy, solar pond, non convective solar pond, applications of solar pond and solar energy, solar water heater, flat plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning. Need and characteristics of photovoltaic (PV) systems, PV models and equivalent circuits, and sun tracking systems.

Wind Energy harvesting: Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines, Power electronic interfaces, and grid interconnection topologies.

Unit-II: **(15 Hrs)**

Ocean Energy: Ocean Energy Potential against Wind and Solar, Wave Characteristics and Statistics, Wave Energy Devices.
Tide characteristics and Statistics, Tide Energy Technologies, Ocean Thermal Energy, Osmotic Power, Ocean Bio-mass.

Geothermal Energy: Geothermal Resources, Geothermal Technologies

Hydro Energy: Hydropower resources, hydropower technologies, environmental impact of hydro power sources.

Piezoelectric Energy harvesting: Introduction, Physics and characteristics of piezoelectric effect, materials and mathematical description of piezoelectricity, Piezoelectric parameters and modeling piezoelectric generators, Piezoelectric energy harvesting applications, Human power

Electromagnetic Energy Harvesting: Linear generators, physics mathematical models, recent applications. Carbon captured technologies, cell, batteries, power consumption Environmental issues and Renewable sources of energy, sustainability.

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References:

1. Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi
2. Solar energy - M P Agarwal - S Chand and Co. Ltd.
3. Solar energy - Suhas P Sukhative Tata McGraw - Hill Publishing Company Ltd.
4. Godfrey Boyle, "Renewable Energy, Power for a sustainable future", 2004, Oxford University Press, in association with The Open University.
5. Dr. P Jayakumar, Solar Energy: Resource Assesment Handbook, 2009
6. J.Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA). http://en.wikipedia.org/wiki/Renewable_energy

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B.SC. II YEAR SEMESTER – III & IV

SEC I & III - THEORY MODEL PAPER

TIME: 2 HOURS | MAX MARKS: 40

SECTION-A

Answer the following Questions in short: 2 x 5 =10 marks

1. UNIT - I
2. UNIT - II

SECTION-B

Answer the following essay type questions: 2 x 15 = 30 marks

1 (a) UNIT – I OR (b) UNIT - II
2 (a) UNIT – II OR (b) UNIT - III

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B.SC. II YEAR SEMESTER – III & IV

SEC I & II - INTERNAL MODEL PAPER

TIME: ½ HOUR **MAX MARKS: 10**

SECTION-A

FILL IN THE BLANKS: **10 x ½ =5 marks**

TEN (10) FIB ½ MARK EACH

SECTION-B

MULTIPLE CHOICE QUESTIONS **10 x ½ =5 marks**

TEN (10) MCQ ½ MARK EACH

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SEMESTER – III PAPER-III
THERMODYNAMICS

PRACTICAL MODEL QUESTION PAPER

Time - 2 Hrs **Max Marks: 25**

I. One Question from Question Bank **20 Marks**

II. Record & Vivavoce **5 Marks**

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Arts, Commerce & Scienc
Principal
Nallakunta, Hyderabad-44

Department of
Physics & Electroni
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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
DEPARTMENT OF PHYSICS
B.SC. II YEAR PHYSICS
SEMESTER – IV PAPER-IV
OPTICS

PRACTICAL MODEL QUESTION PAPER

Time - 2 Hrs **Max Marks: 25**

I. One Question from Question Bank **20 Marks**

II. Record & Vivavoce **5 Marks**

Chairperson **University Nominee** **Members**

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I/C. PRINCIPAL
HINDI MAHAVIDYALAYA
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HEAD
Department of Physics
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(AUTONOMOUS)

Affiliated to Osmania University, Nallakunta, Hyderabad-44

2019-20 CBCS STRUCTURE

SCHEME OF INSTRUCTIONS & EVALUATIONS

B.SC. M P CS

THIRD YEAR SEMESTER-V					Semester End exam		Continuous Internal Evaluation		Total	Practical 3 HRS
Code	Course Title	Course Type	HPW	Credits	Duration in HRS	Marks	Exam Duration	Marks		
BS501	ELECTRICAL CIRCUITS AND NETWORK SKILLS	SEC-3	2T	2	2	40	30 min	10	50	-
BS502	WAVES AND OPTICS	GE-1	2 T	2	2	40	30 min	10	50	-
BS503	MATHEMATICS - V	DSC-1E	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	25
BS504	ELECTROMAGNETISM	DSC-2E	3 T + 3P = 6	3+1=4	3	60	30 min	15	75	25
BS505	COMPUTER SCIENCE - V	DSC-3E	3 T + 2P = 5	3+1=4	3	60	30 min	20	75	25
BS506	MATHEMATICS - VI	DSE- 1E	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	25
BS507	ELECTIVE-1: A: SOLID STATE PHYSICS B: QUANTUM MECHANICS AND APPLICATIONS	DSE-2E	3 T + 3P = 6	3+1=4	3	60	30 min	15	75	25
BS508	COMPUTER SCIENCE - VI	DSE-3E	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	25
		TOTAL	36	28		440		115	700	

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2019-20 CBCS STRUCTURE

SCHEME OF INSTRUCTIONS & EVALUATIONS

B.SC. M P CS										
THIRD YEAR SEMESTER-VI					Semester End exam		Continuous Internal Evaluation		Total	Practical 3 HRS
Code	Course Title	Course Type	HPW	Credits	Duration in HRS	Marks	Exam Duration	Marks		
BS601	BASIC INSTRUMENTATION SKILLS	SEC-4	2T	2	2	40	30 min	10	50	-
BS602	ELECTRICITY AND MAGNETISM AND EMT	GE-2	2T	2	2	40	30 min	10	50	-
BS603	MATHEMATICS - VII	DSC-1F	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	25
BS604	MORDERN PHYSICS	DSC-2F	3 T + 3P = 6	3+1=4	3	60	30 min	15	75	25
BS605	COMPUTER SCIENCE - VII	DSC-3F	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	25
BS606	MATHEMATICS - VIII	DSE- 1F	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	25
BS607	ELECTIVE-II: A: BASIC ELECTRONICS B: PHYSICS OF SEMICONDUCTOR DEVICES	DSE-2F	3 T + 3P = 6	3+1=4	3	60	30 min	15	75	25
BS608	COMPUTER SCIENCE - VIII	DSE-3F	3 T + 2P = 5	3+1=4	3	60	30 min	15	75	25
	TOTAL		36	28		440		110		700
	TOTAL CREDITS			56						

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
DEPARTMENT OF PHYSICS
B.SC. III YEAR PHYSICS
SEMESTER – V PAPER-V
(DSE-COMPULSORY)
ELECTROMAGNETISM

PRACTICAL MODEL QUESTION PAPER

Time - 3 Hrs **Max Marks: 25**

I. One Question from Question Bank **20 Marks**

II. Record & Vivavoce **05 Marks**

Chairperson **University Nominee** **Members**

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Osmania University, Hyd-

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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
DEPARTMENT OF PHYSICS
B.SC. III YEAR PHYSICS
SEMESTER – V PAPER-VI
(DSE- ELECTIVE-I – A & B)

PRACTICAL MODEL QUESTION PAPER

Time - 3 Hrs | Max Marks: 25

I. One Question from Question Bank — 20 Marks

II. Record & Vivavoce — 05 Marks

Chairperson | University Nominee | Members

Department of Physics
Hindi Mahavidyalaya
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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
DEPARTMENT OF PHYSICS
B.SC. III YEAR PHYSICS
SEMESTER – VI PAPER-VII
(DSC- Compulsory)
MODERN PHYSICS

PRACTICAL MODEL QUESTION PAPER

Time - 3 Hrs **Max Marks: 25**

I. One Question from Question Bank **20 Marks**

II. Record & Vivavoce **05 Marks**

Chairperson **University Nominee** **Members**

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Department of Physics
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HINDI MAHAVIDYALAYA, NALLAKUNTA, HYDERABAD
(AUTONOMOUS)
DEPARTMENT OF PHYSICS V-VI SEM

Panel of Examinations

Slno.	Name and Designation	Mobile No.
1 ✓	**Dr. D. Sarala** Head, Department of Physics, St. Ann's Degree College for Women, Mehdipatnam, Hyd. Email: saralatvs@gmail.com	9440750244
2	**Mrs. Kirana. K.** Asst. Professor, Department of Physics Osmania University, Hyderabad. Email:	9966017561
3	**Dr. Somaiah. T.** Univesity College of Science, Saifabad Osmania University, Hyd. Email:	9849154671
4	**Dr. N V Prasad** Asst. Professor, Department of Physics Osmania University, Hyderabad. Email:	9849553669
5	**Dr. Upender. G.** Asst. Professor, Department of Physics Osmania University, Hyderabad. Email:	
6	**Dr. Aparna. D.** Asst. Professor, Department of Physics (OU Engineering) Osmania University, Hyderabad. Email:	
7	**Mr. D. Srinivasu** Asst. Professor, Department of Physics (OU Engineering) Osmania University, Hyderabad. Email:	9849671840
8	**Ms. A. Usha Rani** Asst. Professor, Department of Physics St. Francis, Hyderabad. Email:	
9	**Smt. Komala** Asst. Professor, Department of Physics St. Pious, Ram Nagar, Hyderabad. Email:	

10	**MD. Sheriffudin** Asst. Professor, Department of Physics Osmania University, Hyderabad. Email:	
11	**Dr. N. Narsimhulu** Assoc. Professor, Department of Physics (OU Engineering) Osmania University, Hyderabad. Email:	
12	**Smt. W. Jaya** Asst. Professor, Department of Physics St. Francis, Hyderabad. Email:	
13	**Dr. M. Srinath Reddy** Assoc. Professor, Department of Physics Nizam College, Hyderabad. Email:	
14	**Smt. Dr. Hima Bindu** Assoc. Professor, Department of Physics Nizam College, Hyderabad. Email:	
15	**Smt. Dr. A. Rajini** Assoc. Professor, Department of Physics, Osmania University College for Women, Koti, Hyderabad. Email:	
16	**Dr. S. Narendra Babu** Assoc. Professor, Department of Physics, Osmania University College for Women, Koti, Hyderabad. Email:	
17	**Smt. Dr. Manjula** Assoc. Professor, Department of Physics, Bhavan's New Science College, Narayanguda, Hyderabad. Email:	
18	**Smt. Usha Praveena** Asst. Professor, Department of Physics St. Francis, Hyderabad. Email:	
19	**Smt. Kumudini** Asst. Professor, Department of Physics St. Francis, Hyderabad. Email:	

Chairperson **University Nominee** **Members**

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