

SCHEME OF EXAMINATION FOR B.Sc. (ELECTRONICS) PHYSICS

Semester – I

			Max. marks	I.A.	Time
Paper I	PHY-101		45	5	3 Hrs.
Paper II	PHY-102		45	5	3 Hrs.
Paper III	PHY-103	Practical	50		3 Hrs.

Semester – II

			Max. marks	I.A.	Time
Paper I	PHY-201		45	5	3 Hrs.
Paper II	PHY-202		45	5	3 Hrs.
Paper III	PHY-203	Practical	50		3 Hrs.

Semester – III

			Max. marks	I.A.	Time
Paper I	PHY-301		45	5	3 Hrs.
Paper II	PHY-302		45	5	3 Hrs.
Paper III	PHY-303	Practical	50		3 Hrs.

Semester – IV

			Max. marks	I.A.	Time
Paper I	PHY-401		45	5	3 Hrs.
Paper II	PHY-402		45	5	3 Hrs.
Paper III	PHY-403	Practical	50		3 Hrs.

Note:

1. Practical examination will be held at the end of 2nd Semester (for PHY-103 & PHY-203), 4th Semester (for PHY-303 & PHY 403)
2. One Practical from each paper is to be chosen for the practical examination

B.Sc. ELECTRONICS

Semester-I

Paper I- PHY 101

Max. Marks : 45
Internal Assessment : 05
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 3 units. Eight questions will be set up. At least two questions will be set from each unit and the student will have to attempt at least one question from each unit. A student has to attempt five question in all.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit I

Classification of Solids on the basis of energy band diagram, conductors, Insulators, Semi-conductors, Types of semi-conductors, current in semi-conductors, ideal diode, V-I Characteristics of ideal diode, PN junction diode, Biasing of PN junction diode, junction-capacitance, Current in PN junction diode. Application of PN junction diode as a switch as rectifiers-Half wave rectifier, Full wave rectifier and bridge rectifier, Clamper and clipping circuits, Filter circuits, L,C, L-C, PIE section filters, Zener diode, Multiplier circuits.

Unit II

Bipolar Junction Transistor (BJT), Four regions of operation of BJT, Transistor current component, Transistor as an amplifier, BJT in CE, CB, CC configurations, I/P and O/P characteristics, I/P resistance, O/P resistance, Current gain, Voltage gain, Power gain.

Unit III

Transistor at low frequencies, Graphical analysis of CE configuration, Transistor hybrid model, conversion formulate for the parameters of the three transistor configuration.

References

1. Electronics for Scientist and Engineers by Vishwanathan, Mehta and Rajaraman (Prentic-Hall, India)
2. Electronics Fundamentals and Applications (5th addition) by John, D. Ryder (Prentice-Hall, India)
3. Introduction to Electronics by L.K.Brauson (Prentice-hall, India).
4. Digital Principles and Application by Malvine and Leach (Tata MC Graw hill)
5. Electronic Devices and Circuits by Motershed.
6. Electronic Devices and Circuit-Discrete and Integrated by Y.N. Bapat.

B.Sc. ELECTRONICS

Semester-I

Paper II- PHY 102

Max. Marks : 45
Internal Assessment : 05
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 3 units. Eight questions will be set up. At least two questions will be set from each unit and the student will have to attempt at least one question from each unit. A student has to attempt five question in all.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit I

Ideal voltage source, Open circuit, voltage, Short circuit current, Thevenin's theorem, Norton's Theorems, Super Position Theorem, Reciprocity Theorem, Millman's Theorem, Equivalent network analysis using Kirchoff's laws by Node method and Loop method. Maximum Power Transfer Theorem.

Unit II

Sinusoidal Voltage applied across a combination of circuit elements, Low pass filter, High pass filter, Band pass and Band Rejection filters, step impulse and ramp functions, Differentiating and integrating circuits.

Unit III

Characterization of two ports, Impedence, Admittance and Hybrid parameters, Transformation of parameters, Dependent sources, Voltage and current amplifier, ideal transformer reciprocity, Impedence Convertor.

References

1. Electronics for Scientist and Engineers by Vishwanathan, Mehta and Rajaraman (Prentic-Hall, India)
2. Electronics Fundamentals and Applications (5th addition) by John, D. Ryder (Prentice-Hall, India)
3. Introduction to Electronics by L.K.Brauson (Prentice-hall, India).
4. Digital Principles and Application by Malvine and Leach (Tata MC Graw hill)
5. Electronic Devices and Circuits by Motershed.
6. Electronic Devices and Circuit-Discrete and Integrated by Y.N. Bapat.

**B.Sc. ELECTRONICS
Semester-I**

**Paper III- PHY 103
Practicals**

Max. Marks : 50
Time : 3 Hrs.

Note for Practical papers:-

The practical examination will be of 3 hours.

Distribution of marks:

Experiments	30 marks
Lab. Record	8 marks
Viva-Voce	12 marks

The laboratory record will be assessed by both the external examiners. Distribution of marks of each experiment, Lab record and Viva-voce, oral examination, concerning the experiments in the syllabus are indicated above.

Use of simple (non-programmable) calculator is permissible.

1. Familiarization with CRO, Multi-meter, Bread board etc.
2. Measurement of time period, Voltage and phase shift using CRO
3. Electronic Volt-ohm meter, measurement of peak average and r.m.s. values of given signal, effect of wave form and signal frequency.
4. Junction transistor characteristics for Common Base configuration $V_e I_e$ and $V_E I_E$ and to calculate transistor parameters from graph.
5. Junction transistor parameter to measure common Emitter, h-parameter using various circuit arrangements.
6. Transistor amplifier configuration comparison of a Common Base Common Emitter and Common Collector configuration of a given transistor.
7. Transistor bias stabilization, familiarization method for stabilization of transistor.
8. Study of half wave and full wave rectifier, Measurement of ripple factor.
9. Measurement of resistance, Using a multi-meter, Fabrication of potential divider circuit.

References

1. Experiments in electronics, by W.H. Events (Prentice-Hall, India)
2. Methods of Experimental Physics Vol.2, Electronic Method (Academic Press).

B.Sc. ELECTRONICS

Semester-II

Paper I- PHY 201

Max. Marks : 45
Internal Assessment : 05
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 3 units. Eight questions will be set up. At least two questions will be set from each unit and the student will have to attempt at least one question from each unit. A student has to attempt five question in all.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit I

Emitter follower, comparison of transistor amplifier configuration, Linear analysis of CE transistor amplifier configuration, Linear analysis of CE transistor circuit, Miller's Theorem, Cascading transistor amplifier.

Unit II

Transistor biasing and thermal stabilization, the operating point, stability, Self bias of emitter bias, stabilization against variations of I_{CE} , V_{EB} & Beta, Bias compensation, Thermal runaway, Thermal stability.

Unit III

Junction Field Effect Transistor (JFET), Pinch off voltage, JFET V-I characteristics and transfer characteristics, FET small signal model, Low frequency common source and common drain amplifier, Biasing of FET, FET as voltage variable resistor, MOSFET, depletion and Enhancement mode.

B.Sc. ELECTRONICS

Semester-II

Paper II- PHY 202

Max. Marks : 45
Internal Assessment : 05
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 3 units. Eight questions will be set up. At least two questions will be set from each unit and the student will have to attempt at least one question from each unit. A student has to attempt five question in all.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit I

Binary numbers, Decimal to binary conversion, Binary to Decimal conversion, Binary addition, Subtraction, Multiplication, Division, 1's 2's, 9's, 10's compliments. 2's compliment addition and subtraction, Octal numbers octal to binary conversion, Vice-Versa, Hexa-Decimal number and conversion.

Unit II

BCD Code, 8-4-2-1, 2-5-2-1, excess three codes, Cyclic codes, Gray codes. Digital logic, +ve and -ve logic, Basic Logic gates – AND OR NOT gates, Boolean functions Duality Principle.

Unit III

Demorgans laws, Laws and theorems of Boolean Algebra, Precedence of Operators, Venn diagram, Truth table, Simplification of Boolean's function by Boolean algebra, K-map and its application (Four variables).

References

1. Electronics for Scientist and Engineers by Vishwanathan, Mehta and Rajaraman (Prentic-Hall, India)
2. Electronics Fundamentals and Applications (5th addition) by John, D. Ryder (Prentice-Hall, India)
3. Introduction to Electronics by L.K.Brauson (Prentice-hall, India).
4. Digital Principles and Application by Malvine and Leach (Tata MC Graw hill)
5. Electronic Devices and Circuits by Motershed.
6. Electronic Devices and Circuit-Discrete and Integrated by Y.N. Bapat.

B.Sc. ELECTRONICS

Semester-II

Paper III- PHY 203 Practicals

Max. Marks : 50

Time : 3 Hrs.

Note for Practical papers:-

The practical examination will be of 3 hours.

Distribution of marks:

Experiments	30 marks
Lab. Record	8 marks
Viva-Voce	12 marks

The laboratory record will be assessed by both the external examiners. Distribution of marks of each experiment, Lab record and Viva-voce, oral examination, concerning the experiments in the syllabus are indicated above.

Use of simple (non-programmable) calculator is permissible.

1. Draw the characteristics of a PN Junction diode for various voltages.
2. Junction field effect transistor characteristic. T plot V and I characteristics of JFET.
3. To study the effect of R.C. Time constant when various driving voltages (Square, Triangular and rectifier sine wave) are applied across a series of RC Circuits.
4. To study the performance of a diode as clipper and sketch the output wave form using a calibrated oscilloscope.
5. To study the performance of a diode as clamper and sketch the output wave form using a calibrated oscilloscope.
6. To design a basic logic gate and verify its truth table.
7. To design a battery eliminator having the given specifications.
8. To design a low pass RC and high pass RC filter of given specifications.
9. Study of RC circuit as differentiator and trace the o/p at different values of i) frequencies ii) R and C
10. Study of RC circuit as Integrator and trace the o/p at different values of (i) frequencies (ii) R and C.

References

1. Experiments in electronics, by W.H. Events (Prentice-Hall, India)
2. Methods of Experimental Physics Vol.2, Electronic Method (Academic Press)

B.Sc. ELECTRONICS

Semester-III

PHY 301

Max. Marks : 45
Internal Assessment : 05
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 3 units. Eight questions will be set up. At least two questions will be set from each unit and the student will have to attempt at least one question from each unit. A student has to attempt five question in all.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit-I

Classification of IC's (mono-lithic and Thin Film Monolithic Fabrication techniques; crystal growth diffusion, epitaxy, Photolithography, metallization isolation, crossovers (detailed discussions). Monolithic devices BJT (npn, pnp), JFET MOSFET, Diodes Resistors, Capacitors (simple idea only)

Unit-II

Differential amplifier, Differential gain, Common mode gain, CMRR, ideal operational amplifier, Feed back in Op-Amp in inverting and non-inverting configuration, Buffer, summer, input bias current input offset voltage. Error introduced by offset voltage, integrating and Differentiating circuits using OPAMP, difference, Multiplication, division, Threshold discrimination.

Unit-III

Principle of voltage regulation, shunt regulators Zener diode Shunt regulator, BJT shunt regulator Series Voltage regulator, feedback regulator, Power Supply regulation, using OPAMP, Load regulation Stability, Zener diode regulator, short circuit protection, current regulation, using op.amp. regulators (IC 723 and three terminal regulators)

References:

1. Electronics for Scientists & Engineers by Vishwanathan Mehta and Rajaraman (Prentice hall India).
2. Electronic instrumentation and measurement techniques by WD Copper and AD Halfbrick
3. Electronic Fundamental and applications IVth Edition by John D.Ryder.
4. Integrated Electronics by Millman & Halkias.
5. Electronic Devices & circuit by Mottor shed.

B.Sc. ELECTRONICS

Semester-III

PHY 302

Max. Marks : 45
Internal Assessment : 05
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 3 units. Eight questions will be set up. At least two questions will be set from each unit and the student will have to attempt at least one question from each unit. A student has to attempt five question in all.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit-I

Saturated and non-saturated logics, Resistor, Transistor Logic (RTL), Diode-transistor logic (DTL), Transistor Transistor logic (TTL), Emitter coupled logic, (EGL), integrated Injunction logic (IIL), Complimentary Metal Oxide Semi-conductor (CMOS), Logic, current sinking and sourcing, logic circuit Parameters-Propagation delay, number of levels, Fan in, Fan out, Loading Noise margin, Combination circuit design procedure analog to digital converter, realization of Boolean expression with NAND/NOR gate, Design of a railway track switching system.

Unit-II

Half adder, Full adder, a parallel binary adder 8-4-2-1 adder or excess 3 adder, half subtractor, full subtractor, 2's complement adder/subtractor, multiplexer and their use in combinational logic design, Demultiplexer, Decoder and their use in combinational design, Parity generator/Checker, Code convertor.

Unit-III

Basics of sequential circuits, Asynchronous & synchronous sequential circuits, flip-flops, R-S, J-K-M, master-slave JK, T&D type flip-flops, Counters binary counter, Ripple counter and synchronous counter, Up and down counters.

References:

1. Electronics for Scientists & Engineers by Vishwanathan Mehta and Rajaraman (Prentice hall India).
2. Electronic instrumentation and measurement techniques by WD Copper and AD Halfbrick
3. Electronic Fundamental and applications IVth Edition by John D.Ryder.
4. Integrated Electronics by Millman & Halkias.
5. Electronic Devices & circuit by Mottor shed.

B.Sc. ELECTRONICS

Semester-III

PHY 303 Practicals

Max. Marks : 50
Time : 3 Hrs.

Note for Practical papers:-

The practical examination will be of 3 hours.

Distribution of marks:

Experiments	30 marks
Lab. Record	8 marks
Viva-Voce	12 marks

The laboratory record will be assessed by both the external examiners. Distribution of marks of each experiment, Lab record and Viva-voce, oral examination, concerning the experiments in the syllabus are indicated above.

Use of simple (non-programmable) calculator is permissible.

1. To study & design Hartley oscillator & measure its frequency.
2. To study & design colpits oscillator & measure its frequency for two values of inductance & with ferrite core.
3. To study and design of phase shift oscillator and measure its frequency.
4. To study the condition for sustained oscillation for Wein bridge oscillator.
5. Operational amplifier
 1. Unity gain buffer
 2. Inverting amplifier
 3. Non-inverting amplifier
6. Operational Amplifier
 1. Summing amplifier
 2. difference amplifier.
7. Measurement of offset voltage and bias currents & CMRR of an operational amplifier
8. Integrating & differentiating circuits using Op-amp.
9. To study the 555 IC timer and its application as monostable and astable multivibrator.
10. To study the working of Schmitt trigger using operational amplifier.

B.Sc. ELECTRONICS

Semester-IV

PHY 401

Max. Marks : 45
Internal Assessment : 05
Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 3 units. Eight questions will be set up. At least two questions will be set from each unit and the student will have to attempt at least one question from each unit. A student has to attempt five question in all.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit-I

Feedback-positive and negative feedback, Effect of negative feedback on gain, Non-linear distortion, input resistance, Frequency response, Voltage series and shunt feedback, Current series feedback. Active filters using op.amp (Lowpas and highpass Band pass and Band reject).

Unit-II

Principle of oscillatoions, condition for sustained oscillation, RF Oscillators, Hartley, Colpit, Crystal Oscillator (Principle of working and frequency oscillation), AF Oscillators” Wein Bridge, Phase shift Oscillators.

Unit-III

Multivibrator (Astable, Bistable, Monostable, Schmitt Trigger, Unijunction transisitor, (UJT), Sillicon controller, Rectifier (SCR), Triac, Diac Sillicon Controller Switch (SCS), Controller rectification, pluse control of SCR Phase Control of SCR, SCR Controller circuits, UJT Sawtooth wave generator, Triangular waveform generator.

References:

1. Electronics for Scientists & Engineers by Vishwanathan Mehta and Rajaraman (Prentice hall India.
2. Electronic instrumentation and measurement techniques by WD Copper and AD Halfrick
3. Electronic Fundamental and applications IVth Edition by John D.Ryder.
4. Integrated Electronics by Millman & Halkias.
5. Electronic Devicies & circuit by Mottor shed.

B.Sc. ELECTRONICS

Semester-IV

PHY 402

Max. Marks : 45

Internal Assessment : 05

Time : 3 Hrs.

NOTE :

1. The syllabus is divided into 3 units. Eight questions will be set up. At least two questions will be set from each unit and the student will have to attempt at least one question from each unit. A student has to attempt five question in all.
2. 20% numerical problems are to be set.
3. Use of Scientific (non-programmable) calculator is allowed.

Unit-I

Memories, memory organization and its parameters. Read only Memories (ROM), Random Access Memory (RAM), Application of ROM, Static Random access memories (SRAM), Dynamic Ram, Digital to Analog conversion (D/A) Binary weight, ladder type, Serial, BCD D/A conversion, Analog to digital conversion A/D, Single slope & dual slope and their parameters.

Unit-II

Transducers classification, Strain gauge displacement, Temperature measurement Resistance Thermometer, Thermocouple and Thermister, Photomultiplier tubes, photovoltaic cells Photoemissive cells, Light Emitting Diode (LED) construction and working.

Unit-III

Electronic Multimeter, Basic circuit, Characteristics of Electronic instruments, accuracy, precision sensitivity, Resolution and different types of errors Cathode ray oscilloscope, Block diagram, Cathode ray tube (CRT), Electrostatic deflection, Post deflection, acceleration, Horizontal and vertical deflection system, Digital storage oscilloscope Block diagram and explain in briefly.

References:

1. Electronics for Scientists & Engineers by Vishwanathan Mehta and Rajaraman (Prentice hall India.
2. Electronic instrumentation and measurement techniques by WD Copper and AD Halfrick
3. Electronic Fundamental and applications IVth Edition by John D.Ryder.
4. Integrated Electronics by Millman & Halkias.
5. Electronic Devicies & circuit by Mottor shed.

B.Sc. ELECTRONICS
Semester-IV
PHY 403
Practicals

Max. Marks : 50

Time : 3 Hrs.

Note for Practical papers:-

The practical examination will be of 3 hours.

Distribution of marks:

Experiments	30 marks
Lab. Record	8 marks
Viva-Voce	12 marks

The laboratory record will be assessed by both the external examiners. Distribution of marks of each experiment, Lab record and Viva-voce, oral examination, concerning the experiments in the syllabus are indicated above.

Use of simple (non-programmable) calculator is permissible.

1. To study and design DTL NAND gate using discrete components and verify its truth table.
2. To study and design TTL NAND gate using discrete components and verify its truth table.
3. To study half Adder/full adder, and verify its truth table.
4. To study and verify the truth table of JK, D&T type flip-flaps.
5. BCD Decade counter, verify its truth table.
6. Study ripple Binary counter and verify its truth table.
7. Solid State Rectifier, Study of Characteristic under forward and reverse bias conditions.
8. To study the operation of transistorized Monostable multivibrator circuit and measure its delay time.
9. To study the operation of transistorized Astable multivibrator circuit and measure its frequency.

Projects topics are:

1. Electronic Multimeter using IC
2. Solid State Power controller using thyristor.
3. Function generator using IC
4. Time base generator
5. Regulated power supply using ICs.
6. Event Counter.
7. Transistor tester (NPN, PNP)
8. Electronic Timer with Alaram
9. Design of an under/over voltage cut off circuit
10. Transformer less o/p amplifier stage.

References:

1. Experiments in electronics by W.H. Events (Prentice Hall India)
2. Method of experimental Physics Vol.2 Electronic Method (Acad Press)
3. Experimental in electronics by Ravi Taj Dudeja.