BABU BANARASI DAS UNIVERSITY, LUCKNOW

B. Sc. (Honours) Electronic Science

COURSE STRUCTURE (Under CBCS)

Course Category	Course Code	Course Name	Teaching			Evaluation					Credits
						Theory		Lab/ Seminar/ Viva voce/ Dissertation		Total	
			L	T	P	CIA	ESE	CIA	ESE		
SEMESTER – I											
Core	BSE 1101	Basic Circuit Theory and Network Analysis	4		4	40	60	20	30	150	6
Core	BSE 1102	Mathematics Foundation for Electronics	5	1		40	60	-	-	100	6
GE		Generic Elective - I									6
AECC	BSAE 1101	Communicative English	2	-	-	40	60	-	-	100	2
GP	BSGP11	General Proficiency						100	-	100	1
											21
SEMESTER – II											
Core	BSE 1201	Semiconductor Devices	4	-	4	40	60	20	30	150	6
Core	BSE 1202	Applied Physics	5	1	-	40	60	-	-	100	6
GE		Generic Elective - II									6
AECC	BSAE1201	Environmental Studies	2	-	-	40	60	-	-	100	2
GP	BSGP12	General Proficiency				-	-	100	-	100	1
											21
SEMESTER – III											
Core	BSE 1301	Electronics Circuits	5	1	-	40	60	-	-	100	6
Core	BSE 1302	Digital Electronics	4	-	4	40	60	20	30	150	6
Core	BSE 1303	C Programming and Data Structures	4	-	4	40	60	20	30	150	6
GE		Generic Elective - IIII									6
SEC		Skill Enhancement Course - I									2
GP	BSGP13	General Proficiency	-	-	-	-	-	100	-	100	1
											27
SEMESTER – IV											
Core	BSE 1401	Operational Amplifiers and Applications	4	-	4	40	60	20	30	150	6
Core	BSE 1402	Signals & Systems	5	1	-	40	60	-	-	100	6
Core	BSE 1403	Electronic Instrumentation	4	-	4	40	60	20	30	150	6
GE		Generic Elective - IV									6
SEC		Skill Enhancement Course - I									2
GP	BSGP14	General Proficiency	-	-	-	-	-	100		100	1
											27
SEMESTER – V											
Core	BSE 1501	Microprocessor and Microcontrollers	4		4	40	60	20	30	150	6
Core	BSE 1502	Electromagnetic	5	1	-	40	60	-	-	100	6
DSE	BSE 1551	Discipline Specific Elective - I	5	1	-	40	60	-	-	100	6
DSE	BSE 1552	Discipline Specific Elective - II	5	1	-	40	60	-	-	100	6
Lab	BSS15	Seminar	-	-	-			100	-	100	2
											26
SEMESTER – VI											
Core	BSE 1601	Communication Electronics	4		4	40	60	20	30	150	6
Core	BSE 1602	Photonics	5	1	-	40	60	-	-	100	6
DSE	BSE 1651	Discipline Specific Elective - III	5	1	-	40	60	-	-	100	6
DSE	BSE 1652	Discipline Specific Elective - IV	5	1	-	40	60	-	-	100	6
Lab	BSV16	Vice Voce	-	-	-	-	-	-	100	100	2
											26

ELECTIVE COURSES – B. Sc. (Honours) Electronics Science

Code	Title	Teaching			Evaluation				Total	Credits
					Theory		Lab/Seminar/ Viva Voce/ Dissertation			
		L	T	P	CIA	ESE	CIA	ESE		
Generic Elective – I										
BSM 1101	Calculus	5	1	-	40	60	-	-	100	6
BSC 1102	Computer System Architecture	5	1		40	60			100	6
Generic Elective – II										
BSM 1202	Differential Equations	5	1	-	40	60	-	-	100	6
BSC 1202	Discrete Structure	5	1		40	60			100	6
Generic Elective – III										
BSM 1303	PDE and System of ODE	5	1	-	40	60	-	-	100	6
BSC 1301	Operating Systems	5	1		40	60	20	30	150	6
Generic Elective – IV										
BSM 1401	Numerical Methods	5	1	-	40	60	-	-	100	6
BSC 1403	Database Management Systems	5	1		40	60	20	30	150	6

Discipline Specific Elective – I										
BSE 1551	Control Systems	5	1	-	40	60	-	-	100	6
BSE 1552	Semiconductor Fabrication and Characterization	5	1	-	40	60	-	-	100	6
BSE 1553	Electrical Machines	5	1	-	40	60	-	-	100	6
Discipline Specific Elective – II										
BSE 1554	Digital Signal Processing	5	1	-	40	60	-	-	100	6
BSE 1555	Power Electronics	5	1	-	40	60	-	-	100	6
BSE 1556	Nanoelectronics	5	1	-	40	60	-	-	100	6
Discipline Specific Elective – III										
BSE 1651	Transmission Lines, Antenna and Wave Propagation	5	1	-	40	60	-	-	100	6
BSE 1652	Basic VLSI Design	5	1	-	40	60	-	-	100	6
BSE 1653	Embedded Systems	5	1	-	40	60	-	-	100	6
Discipline Specific Elective – IV										
BSE 1655	Computer Networks	5	1	-	40	60	-	-	100	6
BSE 1656	Modern Communication Systems	5	1	-	40	60	-	-	100	6
BSE 1657	Dissertation	-	-	12	40	60	-	-	100	6

Skill Enhancement Course – I										
BSS 1301	LaTeX and HTML	1	-	2	40	60	50	-	150	2
BSS 1311	Internet Technologies	2	-	-	40	60	-	-	100	2
Skill Enhancement Course – II										
BSS 1411	Linux / Unix Programming	1	-	2	40	60	50	-	150	2
BSS 1421	Programming in MATLAB	1	-	2	40	60	50	-	150	2

BABU BANARASI DAS UNIVERSITY, LUCKNOW

B. Sc. (Honours) Electronic Science

SYLLABUS

Course Name	**Basic Circuit Theory and Network Analysis**		
Category: Core	**Code: BSE 1101**	**Credits: 6**	**L-4 T-0 P-4**
Exam: Theory 3 Hrs, Practical 2 Hrs	**ESE (Theory): 60 Marks** **CIA (Theory): 40 Marks**		
ESE (Lab): 30 Marks	**CIA (Lab): 20 Marks**		

SYLLABUS

Module I:

Basic Circuit Concepts: Voltage and Current Sources, Resistors: Fixed and Variable resistors, Construction and Characteristics, resistors in series and parallel. Inductors: Fixed and Variable inductors, Self and mutual inductance, Faraday's law and Lenz's law of electromagnetic induction, Energy stored in an inductor, Inductance in series and parallel, Capacitors: Principles of capacitance, Parallel plate capacitor, Permittivity, Definition of Dielectric Constant, Dielectric strength, Energy stored in a capacitor, types of capacitor and their application, capacitors in series and parallel, factors governing the value of capacitors.

Module II:

Circuit Analysis And DC Transient Analysis : Kirchhoff's Current Law (KCL), Kirchhoff's Voltage Law (KVL), Node Analysis, Mesh Analysis, Star-Delta Conversion. RC Circuit- Charging and discharging with initial charge, RL Circuit with Initial Current, Time Constant, RL and RC Circuits With Sources, DC Response of Series RLC Circuits.

Module III:

AC Circuit Analysis : Sinusoidal Voltage and Current, Definition of Instantaneous, Peak, Peak to Peak, Root Mean Square and Average Values. Voltage-Current relationship in Resistor, Inductor and Capacitor, Phasor, Complex Impedance, Power in AC Circuits: Instantaneous Power, Average Power, Reactive Power, Power Factor. Sinusoidal Circuit Analysis for RL, RC and RLC Circuits. Resonance in Series and Parallel RLC Circuits, Frequency Response of Series and Parallel RLC Circuits, Quality (Q) Factor and Bandwidth. Passive Filters: Low Pass, High Pass, Band Pass and Band Stop.

Module IV:

Network Theorems : Principal of Duality, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Reciprocity Theorem, Millman's Theorem, Maximum Power Transfer Theorem. AC circuit analysis using Network theorems. Two Port Networks: Impedance (Z) Parameters, Admittance (Y) Parameters, Transmission (ABCD) Parameters.

Recommended Books:

1. A.Chakrabarti, "Circuit Theory (Analysis and Synthesis)" , Dhanpat rai & Co.
2. Network Analysis And Synthesis by Franklin F .Kuo, John Wiley And Sons.
3. W. H. Hayt, J. E. Kemmerly, S. M. Durbin, Engineering Circuit Analysis, Tata McGraw Hill(2005)
4. Alexander and M. Sadiku, Fundamentals of Electric Circuits , McGraw Hill (2008)
5. S. A. Nasar, Electric Circuits, Schaum's outline series, Tata McGraw Hill (2004)
6. Electrical Circuits, M. Nahvi and J. Edminister, Schaum's Outline Series, Tata McGraw-Hill.(2005)

Basic Circuit Theory and Network Analysis Lab

1. Familiarization with
    a. Resistance in series, parallel and series – Parallel.
    b. Capacitors in series & Parallel.
2. Study of Multimeter.
3. Study of C.R.O.
4. Verification of Kirchoff's Law.
5. Verification of Norton's theorem.
6. Verification of Thevenin's Theorem.
7. Verification of Superposition Theorem.
8. Verification of the Maximum Power Transfer Theorem.
9. RC Circuits: Time Constant, Differentiator, Integrator.
10. Designing of a Low Pass RC Filter and study of its Frequency Response.
11. Designing of a High Pass RC Filter and study of its Frequency Response.

Course Name	Mathematics Foundation for Electronics		
Category: Core	Code: BSE 1102	Credits: 6	L-5 T-1 P-0
Exam: Theory 3 Hrs	ESE: 60 Marks	CIA: 40 Marks	

SYLLABUS

Module I:

Matrices: Introduction to Matrices, System of Linear Algebraic Equations, Gaussian Elimination Method, Gauss-Seidel Method, LU decomposition, Solution of Linear System by LU decomposition. Eigen Values and Eigen Vectors, Linear Transformation, Properties of Eigen Values and Eigen Vectors, Cayley-Hamilton Theorem

Module II:

Sequences and series: Sequences, Limit of a sequence, Convergence, Divergence and Oscillation of a sequence, Infinite series, Necessary condition for Convergence, Cauchy's Integral Test, D'Alembert's Ratio Test, Cauchy's nth Root Test, Alternating Series, Leibnitz's Theorem, Absolute Convergence and Conditional Convergence.

Module III:

Complex Variables and Functions: Analytic Functions, Cauchy-Riemann (C- R) Equations, Harmonic and Conjugate Harmonic Functions, Exponential Function, Trigonometric Functions, Hyperbolic Functions, Cauchy's Integral Theorem, Cauchy's Integral Formula, Derivative of Analytic Functions, Taylor's Series, Laurent Series, Zeroes and Poles.

Module IV:

Integral Transform: Fourier Integral and Fourier Transform, Fourier Integral theorem, Finite and Infinite Integral, Laplace Transform of Elementary Function (Dirac Delta & Green's Function). Solution of Simple Differential Equations.

Recommended Books:

1. E. Kreyszig, Advanced engineering mathematics, Wiley India (2008)
2. Murray Spiegel, Seymour Lipschutz, John Schiller, Outline of Complex Variables, Schaum Outline Series, Tata McGraw Hill (2007)
3. R. K. Jain, and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing House (2007)

4. C .R. Wylie and L. C. Barrett, Advanced Engineering Mathematics, Tata McGraw-Hill (2004)
5. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Limited (2007)

Course Name	Semiconductor Devices			
Category: Core		Code: BSE 1201	Credits: 6	L-4 T-0 P-4
Exam: Theory 3 Hrs, Practical 2 Hrs		ESE(Theory) : 60 Marks CIA ((Theory) : 40 Marks		
ESE (Lab): 30 Marks	CIA (Lab): 20 Marks			

SYLLABUS

Module I:

Semiconductor Basics: Introduction to Semiconductor Materials, Crystal Structure, Metals, Semiconductors and Insulators, Direct and indirect semiconductors, Carrier Concentration at Normal Equilibrium in Intrinsic semiconductors, Derivation of Fermi Level for Intrinsic & Extrinsic Semiconductors, Carrier Transport Phenomena: Conductivity & Mobility, Carrier Drift, Resistivity, Hall Effect, Diffusion Process, Current Density Equation, Einstein Relation, Diffusion And Recombination Processes: Continuity Equation.

Module II:

P-N Junction Diode: Formation of Depletion Layer, Space Charge at a Junction, Derivation of Electrostatic Potential Difference at Thermal Equilibrium, Depletion Width, Derivation of Diode Equation and I-V Characteristics. Zener and Avalanche Junction Breakdown Mechanism, Rectifying Contacts , Ohmic Contacts.

Module III:

Bipolar Junction Transistors (BJT): PNP and NPN Transistors, Basic Transistor Action, Amplification With BJTS: Emitter Efficiency, Base Transport Factor, Current Gain, Base- Width Modulation, Modes of operation, Input and Output Characteristics of CB, CE and CC Configurations.

Module IV:

Field Effect Transistors: JFET, Construction, Idea of Channel Formation, Pinch-Off and Saturation Voltage, Current-Voltage Output Characteristics. MOSFET, types of MOSFETs, Circuit symbols, Working and Characteristic curves of Depletion type MOSFET (both N channel and P Channel) and Enhancement type MOSFET (both N channel and P channel). Complimentary MOS (CMOS).

Special Devices: Varactor Diode, Photodiode, solar cell: circuit symbol, characteristics, applications, Light Emitting Diodes (LED)**,** Tunnel diode, IMPATT Diode, Gunn Diode.

Recommended Books:

1. S. M. Sze, Semiconductor Devices: Physics and Technology, 2ndEdition, Wiley India edition (2002).
2. Adel S. Sedra& Kenneth C. Smith, “Microelectronic Circuits”, Oxford.
3. Ben G Streetman and S. Banerjee, Solid State Electronic Devices, Pearson Education (2006).
4. Millman&Halkias, “Electronic Devices And circuits”, TMH.
5. Jasprit Singh, Semiconductor Devices: Basic Principles, John Wiley and Sons (2001)
6. Kanaan Kano, Semiconductor Devices, Pearson Education (2004)
7. Robert F. Pierret, Semiconductor Device Fundamentals, Pearson Education (2006)

Semiconductor Devices Lab

1. Study of the I-V Characteristics of Diode – Ordinary and Zener Diode.
2. Study of the half wave rectifier and Full wave rectifier.
3. Study of clipping and clamping circuits.
4. Zener diode as voltage regulator – load regulation.
5. Study of the I-V Characteristics of the CE configuration of BJT.
6. Study of the I-V Characteristics of the Common Base Configuration of BJT.
7. Study of the I-V Characteristics of the Common Collector Configuration of BJT.
8. Study of the frequency response of Common Source FET amplifier.
9. Designing of PCB using artwork, its fabrication and testing.
10. Design, fabrication and testing of a 9 V power supply with Zener regulator.

Course Name	Applied Physics		
Category: Core	Code: BSE 1202	Credits: 6	L-5 T-1 P-0
Exam: Theory 3 Hrs	ESE: 60 Marks	CIA: 40 Marks	

SYLLABUS

Module I:

Quantum Physics: Inadequacies of Classical physics. Compton's effect, Wave-particle duality, de Broglie waves. Basic postulates and formalism of quantum mechanics: probabilistic interpretation of waves, conditions for physical acceptability of wave functions. Schrodinger wave equation for a free particle and in a force field (1 dimension), Boundary and continuity conditions. Operators in Quantum Mechanics, Conservation of probability, Time-dependent form, Linearity and superposition, Operators, Timeindependent one dimensional Schrodinger wave equation, Stationary states, Eigen-values and Eigen functions. Particle in a one-dimensional box, Extension to a three dimensional box, Potential barrier problems, phenomenon of tunneling

Module II:

Mechanical Properties of Materials: Elastic and Plastic Deformations, Hooke's Law, Elastic Moduli, Brittle and Ductile Materials, Tensile Strength, Theoretical and Critical Shear Stress of Crystals. , Hardness, Creep, Fatigue, Fracture.

Module III:

Thermal Properties: Brief Introduction to Laws of Thermodynamics, Concept of Entropy, Concept of Phonons, Heat Capacity, Debye's Law, Lattice Specific Heat, , Thermoelectricity, Seebeck Effect, Thomson Effect, Peltier Effect.

Module IV:

Electric and Magnetic Properties: Conductivity of metals, Ohm's Law, relaxation time, collision time and mean free path, electron scattering and resistivity of metals, heat developed in current carrying conductor. Classification of Magnetic Materials, Origin of Magnetic moment, Origin of dia, para, ferro and antiferro magnetism and their comparison, , Saturation agnetisation and Curie temperature. Magnetic domains.

Recommended Books:

1. S. Vijaya and G. Rangarajan, Material Science, Tata Mcgraw Hill (2003)
2. W. E. Callister, Material Science and Engineering: An Introduction, Wiley India (2006)
3. A. Beiser, Concepts of Modern Physics , McGraw-Hill Book Company (1987)
4. A. Ghatak & S. Lokanathan, Quantum Mechanics: Theory and Applications, Macmillan India (2004)