Ch. Ranbir Singh University, Jind

Scheme of Examination and Syllabus for

Under-Graduate Programme

Subject: ELECTRONICS

Scheme of Examination for Under-Graduate Programme Under Multiple Entry-Exit, Internship and CBCS-LOCF in accordance to NEP-2020 w.e.f. 2023-24 (in phased manner), Subject : Electronics

FIRST YEAR: SEMESTER-1

Remarks	Course	Paper(s)	Nomenclature of Paper	Credits	Hours/ Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme A & C	CC-1 MCC-1 4 credit	B23-ELE-101	Electronic Devices and Network Analysis	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme C only	MCC-2 4 credit	B23-ELE-102	Electronic Components, Measuring Instruments and Amplifiers	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme A	CC-M1 2 credit	B23-ELE-103	Basic Digital Electronics	1	1	10	20	30	3 hrs.
			Practical	1	2	5	15	20	3 hrs.
Scheme A & C	MDC-1 3 credits	B23-ELE-104	Electronics in Daily Life	2	2	15	35	50	3 hrs.
			Practical	1	2	5	20	25	3 hrs.
Scheme C only	CC-M1 4 credit	From Available CC-M1 of 4 credits as per NEP							
Scheme A & C	AEC-1 2 credit	From Available AEC-1 of two credits as per NEP							
	SEC-1 3 credit	From Available SEC-1 of three credits as per NEP							
	VAC-1 2 credit	From Available VAC-1 of two credits as per NEP							

FIRST YEAR: SEMESTER-2

Remarks	Course	Paper(s)	Nomenclature of Paper	Credits	Hours/ Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme A & C	CC-2 MCC-3 4 credit	B23-ELE-201	Electronic Devices and Basic Digital Electronics	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme C only	DSEC-2 4 credit	B23-ELE-202	Power Devices & Multivibrators	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme A only	CC-M2 2 credit	B23-ELE-203	Basic Electronic components & Devices	1	1	10	20	30	3 hrs.
			Practical	1	2	5	15	20	3 hrs.
Scheme A & C	MDC-2 3 credits	B23-ELE-204	Understanding of Mobiles and Computer Systems	2	2	15	35	50	3 hrs.
			Practical	1	2	5	20	25	3 hrs.
Scheme C only	CC-M2 4 credit	From Available CC-M2 of 4 credits as per NEP							
Scheme A & C	AEC-2 2 credit	From Available AEC-2 of two credits as per NEP							
	SEC-2 3 credit	From Available SEC-2 of three credits as per NEP							
	VAC-2 2 credit	From Available VAC-2 of two credits as per NEP							

Internship of 4 credits of 4-6 weeks duration after 2nd Semester

20/7/23

SECOND YEAR: SEMESTER-3

Remarks	Course	Paper(s)	Nomenclature of Paper	Credits	Hours/ Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme A, B & C	CC-3 MCC-4 4 credit	B23-ELE-301	Combinational & Sequential Circuits	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme B & C	MCC-5 4 credit	B23-ELE-302	Digital Electronics	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme A, B & C	MDC-3 3 credits	B23-ELE-303	Electronics in Smart World	2	2	15	35	50	3 hrs.
			Practical	1	2	5	20	25	3 hrs.
Scheme A & C	CC-M3 4 credits	From Available CC-M3 of 4 credits as per NEP							
Scheme B only	CC-M3 (V) 4 credits	From Available CC-M3(V) of 4 credits as per NEP							
Scheme A, B & C	AEC-3 2 credit	From Available AEC-3 of two credits as per NEP							
	SEC-3 3 credit	From Available SEC-3 of three credits as per NEP							
Scheme C only	VAC-3 2 credits	From Available VAC-3 of two credits as per NEP							
Scheme B only	MCC-3	MCC-2 FROM SCHEME C OF FIRST SEMESTER							

SECOND YEAR: SEMESTER-4

Remarks	Course	Paper(s)	Nomenclature of Paper	Credits	Hours/ Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme A, B & C	CC-4 MCC-6 4 credit	B23-ELE-401	Operational Amplifier & Sinusoidal Oscillators	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme B & C	MCC-7 4 credit	B23-ELE-402	IC Fabrication Technology	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme B & C	MCC-8 4 credit	B23-ELE-403	Electronic Communication	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme B & C	DSE-1 4 credit Select one option	B23-ELE-404	Optical Fiber Communication	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
		B23-ELE-405	Wireless & Mobile Communication	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme A, B & C	CC-M4 (V) 4 credits	From Available CC-M4(V) of 4 credits as per NEP							
	AEC-4 2 credit	From Available AEC-3 of two credits as per NEP							
Scheme C only	VAC-4 2 credits	From Available VAC-4 of two credits as per NEP							
Scheme A & B	VAC-3 2 credits	From Available VAC-3 of two credits as per NEP							

Internship of 4 credits of 4-6 weeks duration after 4th Semester (if not done after second semester)

20/7/23

SECOND YEAR: SEMESTER-3

Remarks	Course	Paper(s)	Nomenclature of Paper	Credits	Hours/ Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme A, B & C	CC-3 MCC-4 4 credit	B23-ELE-301	Combinational & Sequential Circuits	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme B & C	MCC-5 4 credit	B23-ELE-302	Digital Electronics	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme A, B & C	MDC-3 3 credits	B23-ELE-303	Electronics in Smart World	2	2	15	35	50	3 hrs.
			Practical	1	2	5	20	25	3 hrs.
Scheme A & C	CC-M3 4 credits	From Available CC-M3 of 4 credits as per NEP							
Scheme B only	CC-M3 (V) 4 credits	From Available CC-M3(V) of 4 credits as per NEP							
Scheme A, B & C	AEC-3 2 credit	From Available AEC-3 of two credits as per NEP							
	SEC-3 3 credit	From Available SEC-3 of three credits as per NEP							
Scheme C only	VAC-3 2 credits	From Available VAC-3 of two credits as per NEP							
Scheme B only	MCC-3	**MCC-2 FROM SCHEME C OF FIRST SEMESTER**							

SECOND YEAR: SEMESTER-4

Remarks	Course	Paper(s)	Nomenclature of Paper	Credits	Hours/ Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme A, B & C	CC-4 MCC-6 4 credit	B23-ELE-401	Operational Amplifier & Sinusoidal Oscillators	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme B & C	MCC-7 4 credit	B23-ELE-402	IC Fabrication Technology	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme B & C	MCC-8 4 credit	B23-ELE-403	Electronic Communication	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme B & C	DSE-1 4 credit Select one option	B23-ELE-404	Optical Fiber Communication	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
		B23-ELE-405	Wireless & Mobile Communication	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme A, B & C	CC-M4 (V) 4 credits	From Available CC-M4(V) of 4 credits as per NEP							
	AEC-4 2 credit	From Available AEC-3 of two credits as per NEP							
Scheme C only	VAC-4 2 credits	From Available VAC-4 of two credits as per NEP							
Scheme A & B	VAC-3 2 credits	From Available VAC-3 of two credits as per NEP							

Internship of 4 credits of 4-6 weeks duration after 4th Semester (if not done after second semester)

20/7/23

THIRD YEAR: SEMESTER-5

Remarks	Course	Paper(s)	Nomenclature of Paper	Credits	Hours/ Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme A, B & C	CC-5 MCC-9 4 credit	B23-ELE-501	Transducers and Sensors	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme B & C	MCC-10 4 credit	B23-ELE-502	Digital Signal Processing	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme B & C	DSE-2 4 credit Select one Option	B23-ELE-503	Microprocessor Architecture and Programming with 8085	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
		B23-ELE-504	Optoelectronic Devices	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme B & C	DSE-3 4 credit Select one Option	B23-ELE-505	Mechatronics	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
		B23-ELE-506	Embedded Systems	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme A & C	CC-M5 (V) 4 credits	From Available CC-M5(V) of 4 credits as per NEP							
Scheme A, B & C	Internship 4 credits	Internship#4 credit after 4th semester							

THIRD YEAR: SEMESTER-6

Remarks	Course	Paper(s)	Nomenclature of Paper	Credits	Hours/ Week	Internal marks	External Marks	Total Marks	Exam Duration
Scheme A, B & C	CC-6 MCC-11 4 credit	B23-ELE-601	Microcontroller 8051 and its Interfacing	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme B & C	MCC-12 4 credit	B23-ELE-602	Basic Electrical Engineering & Skills	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme B & C	DSE-4 4 credit Select one Option	B23-ELE-603	Interfacing Peripheral Devices and Applications of 8085	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
		B23-ELE-604	Verilog and FPGA based System Design	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme B & C	DSE-5 4 credit Select one Option	B23-ELE-605	Introduction to C and its programming	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
		B23-ELE-606	Modern communication systems	3	3	20	50	70	3 hrs.
			Practical	1	2	10	20	30	3 hrs.
Scheme A only	CC-M6 4 credits	From Available CC-M6 of 4 credits as per NEP							
Scheme A only	CC-M7(V) 4 credits	From Available CC-M7(V) of 4 credits as per NEP							
Scheme B only	CC-M5(V) 4 credits	**From Available CC-M5(V) of 4 credits as per NEP**							
Scheme C only	CC-M6(V) 4 credits	**From Available CC-M6(V) of 4 credits as per NEP**							
Scheme C only	SEC-4 2 credit	From Available SEC-4 of two credits as per NEP							

FOURTH YEAR: SEMESTER-7 (FOR HONOURS/HONOURS WITH RESEARCH IN ELECTRONICS)

Remarks	Course	Paper(s)	Nomenclature of Paper	Credits	Hours/ Week	Internal marks	External Marks	Total Marks	Exam Duration
for Honours in Electronics/ Honours with Research in Electronics (For Scheme B & C)	CC-H1 4 credit	B23-ELE-701	Digital Circuits and System Design	4	4	30	70	100	3 hrs.
	CC-H2 4 credit	B23-ELE-702	MOS Analog Circuits	4	4	30	70	100	3 hrs.
	CC-H3 4 credit	B23-ELE-703	Instrumentation and Control Systems	4	4	30	70	100	3 hrs.
	DSE-H1 4 credit Select one Option	B23-ELE-704	Optical Fiber Communication	4	4	30	70	100	3 hrs.
		B23-ELE-705	CAD Tools for VLSI	4	4	30	70	100	3 hrs.
	PC-H1 4 credit	B23-ELE-706	Practical Based on B23-ELE-701 TO 704/705	4	8	30	70	100	6 hrs.
	CC-HM1 4 credit	From Available Minor of 4 credits as per NEP							

SEMESTER-8 (FOR HONOURS IN ELECTRONICS)

Remarks	Course	Paper(s)	Nomenclature of Paper	Credits	Hours/ Week	Internal marks	External Marks	Total Marks	Exam Duration
Honours in Electronics (For Scheme B & C)	CC-H4 4 credit	B23-ELE-801	Microwave devices and systems	4	4	30	70	100	3 hrs.
	CC-H5 4 credit	B23-ELE-802	MOS Digital Circuits	4	4	30	70	100	3 hrs.
	CC-H6 4 credit	B23-ELE-803	Device Models and Circuit Simulation	4	4	30	70	100	3 hrs.
	DSE-H2 4 credit Select one option	B23-ELE-804	Semiconductor Material & Device Characterization	4	4	30	70	100	3 hrs.
		B23-ELE-805	Digital Communication	4	4	30	70	100	3 hrs.
	PC-H2 4 credit	B23-ELE-806	Practical Based on B23-ELE-801 TO 804/805	4	8	30	70	100	6 hrs.
	CC-HM2 4 credit	From Available Minor of 4 credits as per NEP							

OR SEMESTER-8 (FOR HONOURS WITH RESEARCH IN ELECTRONICS)

Remarks	Course	Paper(s)	Nomenclature of Paper	Credits	Hours/ Week	Internal marks	External Marks	Total Marks	Exam Duration
Honours with Research in Electronics (For Scheme B & C)	CC-H4 4 credit	B23-ELE-801	Microwave devices and systems	4	4	30	70	100	3 hrs.
	CC-H5 4 credit	B23-ELE-802	MOS Digital Circuits	4	4	30	70	100	3 hrs.
	Project/ Dissertation 12 credit	B23-ELE-807	Project/Dissertation	8+4	-	-	300	300	-
	CC-HM2 4 credit	From Available Minor of 4 credits as per NEP							

20/7/23

Session: 2023-24			
Part A - Introduction			
Subject	ELECTRONICS		
Semester	FIRST		
Name of the Course	Electronic Devices and Network Analysis		
Course Code	B23-ELE-101		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-1 MCC-1		
Level of the course	100-199		
Pre-requisite for the course (if any)	Physics as a Subject at 4.0 Level (Class XII)		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: 1. understand the construction, working & applications of various semiconductor diodes 2. Learn about the use of filters in rectifiers and about Bipolar Junction Transistor. 3. understand the concept of various network circuits and its uses 4. understand the conversion of one network to another 5. present the experimental results and conclusions by having Hands-on experience in the Laboratory		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	45	30	75
Max. Marks: 100 (70 Theory + 30 Practical) Internal Assessment Marks: 20 Theory +10 Practical End Term Exam Marks: 50 Theory + 20 Practical		Exam Time: 3 Hours each for Theory & Practical	

Part B- Contents of the Course

Instructions for Paper- Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	**Semiconductors Devices & applications**: - Overview of Semiconductors, Junction diode and its characteristics, Zener diode, Voltage Regulation using Zener Diode, shunt and series clipping circuit, clamping circuit. **Rectifiers:** - HWR, FWR, Bridge FWR, calculation of rectifier parameters.	11
II	**Filter circuits:** L, C, LC (Calculation of ripple factor for capacitor filter only), Voltage multiplier Circuit. **Bipolar Junction Transistor:** - Potential curves in unbiased and biased transistor, Transistor current components, Static Characteristics of CB & CE configuration, active, cut off and saturation regions. Transistor current gains (Alpha, Beta, and Gama), Transistor as an Amplifier	12
III	**Network Theorems:** - Superposition theorem, Thevenin's Theorem, **Norton's** Theorem, Maximum Power Transfer Theorem, Millman's Theorem, examples and problems of each topic. **Two–port Network:** -Open Circuit Impedance(Z) Parameters, Short Circuit Admittance (Y) Parameters, Transmission (ABCD) Parameters, Inverse Transmission (A'B'C'D') Parameters, Hybrid(H) Parameters, Inverse Hybrid(g) Parameters	11
IV	Conversion of Parameters, Dependent sources (CCCS, VCVS, VCCS, CCVS), Inter Connection of Two – Port Networks, T and π Representation, Terminated Two-Port Networks, Lattice Networks, Image Parameters	11
V*	**Note:** A candidate is required to perform minimum five experimentsout of the list provided during course of study in this semester. 1. To study the V-I characteristics of PN junction diode. 2. To study the Zener diode as voltage regulator. 3. To study HWR and FWR and measurement of ripple factor with and without C filter. 4. To study diode as shunt clipping clement. 5. To study diode as clamping element. 6. Study of Input and output CB characteristics . 7. Study of CE Input and Output characteristics 8. Measurement of voltageand Time period using CRO. 9. Measurement of resistance value using colour codes and multimeter. Also design and verify the potential divider arrangement using resistances. 10. To verify maximum power transfer theorem for DC network.	30
Suggested Evaluation Methods		

Internal Assessment:	End Term Examination:
➢ **Theory 20 Marks** • Class Participation: **5 Marks** • Seminar/presentation/assignment/quiz/class test etc.: **5 Marks** • Mid-Term Exam: **10 Marks**	50 Marks
➢ **Practicum 10 Marks** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc.: **10 Marks** • Mid-Term Exam:	20 Marks

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Integrated Electronics by Millman and Halkias.
2. Basic Electronics and Linear Circuits by NN Bhargava, DC Kulshreshtha (TTTI)
3. Electronics Devices and Circuit by Allen Mottershead
4. Circuits and Networks by A. Sudhakar, Shyammohan
5. Network Analysis, Publication Khanna by G.K. Mithal
6. Network Analysis, Publication Pearson India by M.E. Van Valkenburg

Session: 2023-24			
Part A – Introduction			
Subject	ELECTRONICS		
Semester	FIRST		
Name of the Course	Electronic Components, Measuring Instruments and Amplifiers		
Course Code	B23-ELE-102		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	MCC-2		
Level of the course	100-199		
Pre-requisite for the course (if any)	Physics as a Subject at 4.0 Level (Class XII)		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: 1. Learn about Passive components and their use 2. Understand the concept and use of different measuring instruments. 3. Understand the basics of Bipolar Junction Transistors 4. Understand the construction and working of different amplifiers 5. Get the Handson experience Through Lab work		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	45	30	75
Max. Marks: 100 (70 Theory + 30 Practical) Internal Assessment Marks: 20 Theory +10 Practical End Term Exam Marks: 50 Theory + 20 Practical		Exam Time: 3 Hours each for Theory & Practical	
Part B- Contents of the Course			

Instructions for Paper- Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	**Passive Components:** Resistors, Capacitors, Inductors, Transformers, Relays, Fuses (their types & applications). **Introduction to Semiconductors:** Energy Band Diagram, Conductors, Semiconductors, Insulators, Intrinsic and Extrinsic Semiconductors (P&N), currents in semiconductors, Diffusion Junction, Depletion Layer, Barrier Potential.	11
II	**Measuring Instruments:** Regulated power supply, Analogue Multimeter, Digital Multimeter, Cathode Ray Oscilloscope, Function Generator (functional block diagram, basic working principle, measuring quantities). **Zener diode regulator**: circuit diagram and explanation for load and line regulation, disadvantages of Zener diode regulator.	11
III	**Bipolar Junction Transistor:** Basic working principle, Input and Output Characteristics of CB & CE configurations, Biasing, Operating point, Load line, thermal runaway, stability and stability factor, Stabilization of Operating Point, Collector to Base bias, Voltage Divider bias and Emitter bias (+VCC &–VEE bias), circuit diagrams and their working.	12
IV	**Amplifiers:** Classification of amplifiers, Class-A, B, AB and C Amplifiers, Cascading of Amplifiers, RC Coupled amplifiers. Properties of amplifiers (distortion, noise, thermal noise, shot noise, noise figure). Feedback in Amplifiers: Feedback concept, transfer gain with feedback, Effect of Negative Feedback on amplifiers performance. Transistor as a switch (circuit and working), Darlington pair and its applications.	11
V*	**Note:** A candidate is required to perform minimum five experimentsout of the list provided during course of study in this semester. 1. Identification and study of Electronics Components. 2. Understanding the use of Function generator and draw the different wave shapes by connecting it with CRO. 3. Understand the use of Multimeter by measuring resistance, capacitance, voltage, frequency, transistor type etc. 4. Measurement of voltage. Time period and phase-shift using CRO. 5. Study of fixed bias arrangement for transistor. 6. Study of Voltage divider bias arrangement for transistor. 7. Study of Collector to base bias arrangement for transistor. 8. Study multi stage R-C coupled amplifier & to determine frequency response & gain 9. Find the gain (i) Class A. Amplifier (ii) Class B. Amplifier (iii) Class C Amplifier. 10. Verify the operation of transistor as a switch and draw the waveform.	30
Suggested Evaluation Methods		

Internal Assessment:	End Term Examination:
➢ **Theory 20 Marks** • Class Participation: **5 Marks** • Seminar/presentation/assignment/quiz/class test etc.: **5 Marks** • Mid-Term Exam: **10 Marks**	50 Marks
➢ **Practicum 10 Marks** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc.: **10 Marks** • Mid-Term Exam:	20 Marks

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Integrated Electronics by Millman and Halkias.
2. Basic Electronics and Linear Circuits by NN Bhargava, DC Kulshreshtha (TTTI)
3. Electronics Devices and Circuit by Allen Mottershead
4. Electronic Devices & Circuits by Sanjeev Gupta , Dhanpat Rai Publications

Session: 2023-24			
Part A - Introduction			
Subject	ELECTRONICS		
Semester	FIRST		
Name of the Course	Basic Digital Electronics		
Course Code	B23-ELE-103		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	**CC-M1**		
Level of the course	100-199		
Pre-requisite for the course (if any)	Physics as a Subject at 4.0 Level (Class XII)		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: 1. To understand the basics of various Number systems and their conversions 2. To understand the basics of Boolean algebra and its theorems 3. To understand the concept and basics of different logic gates 4. To understand the concept and minimization techniques using K-maps 5. To learn and understand the use of various electronic components and equipment's used for analysis of basic digital electronic circuits		
Credits	Theory	Practical	Total
	1	1	2
Contact Hours	15	30	45
Max. Marks: 50 (30 Theory + 20 Practical) **Internal Assessment Marks: 10 Theory + 5 Practical** **End Term Exam Marks: 20 Theory + 15 Practical**		**Exam Time: 3 Hours each for Theory & Practical**	
Part B- Contents of the Course			
Instructions for Paper- Setter 1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.			

Unit	Topics	Contact Hours
I	**Number Systems:** Introduction to Decimal, Binary, Octal, Hexadecimal Number Systems and their inter-conversions; BCD codes, Excess-3 codes, Gray codes, code conversions, binary arithmetic (addition, Subtraction, multiplication, division), 1's and 2's compliments and 9's and 10's compliments.	3
II	**Boolean Algebra:** Postulates & theorems of Boolean algebra, Duality Principle, De-Morgan's Theorem.	4
III	**Logic Gates:** Positive and Negative Logic, Basic Logic Gates: AND, OR, NOT (symbol, truth-table, circuit diagram, working); NAND, NOR, EX-OR, EX-NOR (symbol, truth table).	4
IV	**Minimization Techniques:** Reduction of Boolean expressions using Boolean Identities, SOP and POS form of Boolean functions, Karnaugh Map simplifications, implementations of SOP and POS form using NAND and NOR gates.	4
V*	**Note:** A candidate is required to perform minimum five experiments outof the list provided during course of study in this semester. 1. Design of basis logic gates using discrete components. 2. Study of different type of digital IC's :(functions, pin diagram, block diagram of various Digital ICs etc.). 3. Data Sheet Analysis of Digital ICs (Quote the data sheet of any two digital ICs in Laboratory File). 4. Realization of Boolean Identities on Digital Trainer Kit. 5. Digital trainer using AOI. 6. Digital trainer using NAND gates. 7. Realization of K-map expression on Digital Trainer Kit.	30

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory 10 Marks** • Class Participation: **4 Marks** • Seminar/presentation/assignment/quiz/class test etc.: • Mid-Term Exam: **6 Marks** ➢ **Practicum 5 Marks** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc.: **5 Marks** • Mid-Term Exam:	**End Term Examination: 20 Marks** **15 Marks**

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Digital Electronics by R.P. Jain
2. Digital Computer Electronics by A. P. Malvino

Session: 2023-24			
Part A – Introduction			
Subject	ELECTRONICS		
Semester	FIRST		
Name of the Course	Electronics in Daily Life		
Course Code	B23-ELE-104		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	**MDC-1**		
Level of the course	100-199		
Pre-requisite for the course (if any)	Any Arts, Commerce Subject at 4.0 Level (Class XII)		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: 1. Understand about various electronic components 2. Learn about the use of AC and DC voltages and transformers etc 3. Understand the concept of assembling and disassembling of various home appliances. 4. Learn the concept and importance of earthing 5. To get practical exposure of various electronics components and appliances		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	30	30	60
Max. Marks: 75 (50 Theory + 25 Practical) Internal Assessment Marks: 15 Theory + 5 Practical End Term Exam Marks: 35 Theory + 20 Practical		Exam Time: 3 Hours each for Theory & Practical	
Part B- Contents of the Course			

Instructions for Paper- Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.
3. Medium of examination may be Hindi/English.

Unit	Topics	Contact Hours
I	**Introduction to basic Electronics components and Devices:** Resistor, Color code, Inductor, Capacitor, basic Potentiometer circuit, Multiple range Potentiometer Classification of Instruments, Analog and Digital Mode of operations, Basics of CRO, Multimeter	7
II	AC - DC Voltage, Domestic Electric supply, Transformer, Power consumption, wire, electric tester, clamp meter, Fuse, circuit breaker, Inverter, Electric consumption meter reading, BEE rating, Soldering techniques, LED, Display HD, Full HD and UHD.	8
III	Repair and Maintenance of Home Appliances(Basic idea of Internal Circuit and working): Inverters and UPS, Switch Mode Power Supply, washing Machine , Electric Iron, Microwave Oven, Rice Cooker	9
IV	Measurement of Earth Resistance: Necessity of Earth Electrode, Necessity of measurement of Earth Electrode, Factors effecting Earth Electrodes, Methods of measuring Earth Resistance	6
V*	**Note:** A candidate is required to perform minimum five experiments outof the list provided during course of study in this semester. 1. Measurement of alternating voltage using multimeter. 2. Measurement of voltage and Time period and using CRO. 3. Measurement of resistance value using colour codes and multimeter. 4. Design and verify the potential divider arrangement using resistances. 5. Testing of wire, measuring voltage, current and frequency using multimeter 6. Demonstrate soldering of basic electronics components using soldering iron. 7. Understanding the role of transformer.	30

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory 15 Marks** • Class Participation: **4 Marks** • Seminar/presentation/assignment/quiz/class test etc.: **4 Marks** • Mid-Term Exam: **7 Marks** ➢ **Practicum 5 Marks** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc.: **5 Marks** • Mid-Term Exam:	**End Term Examination:** **35 Marks** **20 Marks**

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. A course in Electrical and Electronic Measurements and Instrumentation by A K Sawhney.
2. Electronics Instrumentation and Measurement Techniques by W D Cooper
3. Handbook of Repair and Maintenance of Domestic Electronics Appliances, Shashi Bhushan Sinha, BPB Publications
4. Getting Down to Earth: A practical guide to earth resistance testing, Megger

Session: 2023-24			
Part A – Introduction			
Subject	ELECTRONICS		
Semester	SECOND		
Name of the Course	Electronic Devices and Basic Digital Electronics		
Course Code	B23-ELE-201		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-2 MCC-3		
Level of the course	100-199		
Pre-requisite for the course (if any)	Electronics as a Subject (CC-1)		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: Student will be able 1. To describe the basic Biasing Techniques. 2. To understand the basics of Field effect transistors 3. To learn about the number systems, conversions and K-map's 4. To understand the basics of Logic gates and Families 5. Hands-on practice of the analog and Digital based experiments		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	45	30	75
Max. Marks: 100 (70 Theory + 30 Practical) Internal Assessment Marks: 20 Theory + 10 Practical End Term Exam Marks: 50 Theory + 20 Practical		Exam Time: 3 Hours each for Theory & Practical	
Part B- Contents of the Course			

Instructions for Paper- Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	**Transistor Biasing Techniques:** -Why Bias a Transistor, Selection of Operating Point, need for Bias Stabilization, Requirement of a Biasing Circuit, Different Biasing Circuits: Bias Circuit with Emitter Resistor, Voltage Divider Biasing Circuit, Emitter-Bias Circuit, Gain of a multi-stage amplifier.	12
II	**Field Effect Transistor:** - Junctions Field Effect Transistor, Qualitative Description of JFET, Drain and transfer characteristics of JFET, FET small signal low frequency model, CS & CD low frequency model, MOSFET -Depletion and enhancement and their drain & transfer characteristics, CMOS (Basic idea).	12
III	**Number Systems:** - Binary, Octal, Hexadecimal number system and base conversions, Binary Arithmetic operations, 1's and 2's complement representation and their arithmetic, Binary codes-BCD, Gray, Error detecting and correcting codes, BCD addition, Boolean Algebra: Postulates, Duality Principle, De Morgan's Law, Simplification of Boolean Identities, Standard SOP & POS Forms, Simplification using K-map (upto 4 variables), don't care condition, implementation of SOP & POS form using NAND and NOR Gate.	11
IV	**Logic Gates:** Positive and Negative logic level, Logic Gates: AND, OR, NOT, XOR, XNOR, NOR, NAND (Definition, Symbols & Truth table). **Logic families:** Unipolar & Bipolar Logic families, characteristics of Digital IC's (fan in, fan out, propagation delay. Noise Margin), RTL (NOR), DTL (NAND), TTL (NAND), CMOS Logic gate (NAND, NOR).	10
V*	**Note:** A candidate is required to perform minimum five experimentsout of the list provided during course of study in this semester. 1. Study of fixed bias arrangement for transistors. 2. Study of voltage divider biasing arrangement for transistors. 3. Study of two stage R-C coupled transistor amplifier. 4. Study of JFET characteristics. 5. Study of different type of digital IC's :(functions, pin diagram, block diagram of various Digital ICs etc.). 6. Design of basis logic gates using discrete components. 7. Study of DTL NAND gate. 8. Study of TTL NAND gate. 9. Digital trainer using AND, OR & NOT gates. 10. Digital trainer using NAND gates.	30

Suggested Evaluation Methods	
Internal Assessment: ➢ **Theory 20 Marks** • Class Participation: **5 Marks** • Seminar/presentation/assignment/quiz/class test etc.: **5 Marks** • Mid-Term Exam: **10 Marks** ➢ **Practicum 10 Marks** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc.: **10 Marks** • Mid-Term Exam:	**End Term Examination:** 50 Marks 20 Marks

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Basic Electronics and Linear Circuits by NN Bhargava, D C Kulshreshtha
2. Integrated Electronics by Millman and Halkias
3. Electronics Devices and Circuit by Allen Mottershead
4. Digital Electronics by R.P. Jain
5. Digital Computer Electronics by Albert Paul Malvino

Session: 2023-24			
Part A - Introduction			
Subject	ELECTRONICS		
Semester	FIRST		
Name of the Course	Power Devices and Multivibrators		
Course Code	B23-ELE-202		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	**DSEC-2**		
Level of the course	100-199		
Pre-requisite for the course (if any)	Electronics as a Subject (CC-1)		
Course Learning Outcomes (CLO):	After completing this course, the student will be able to: 1. Understand the working of Power Device SCR 2. Understand the working and applications of DIAC, TRIAC & UJT 3. Understand the use and working of Choppers 4. Understand the working and design of multivibrators. 5. Hands-on practice of the power devices and multivibrators based experiments		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	45	30	75
Max. Marks: 100 (70 Theory + 30 Practical) Internal Assessment Marks: 20 Theory + 10 Practical End Term Exam Marks: 50 Theory + 20 Practical		Exam Time: 3 Hours each for Theory & Practical	

Part B- Contents of the Course

Instructions for Paper- Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours

I	**POWER SEMI CONDUCTOR DEVICES-I**: Introduction to Thyristors, comparison of Transistors and Thyristors, Thyristors Family, Silicon Controlled Rectifiers (SCR's), Two transistor analogy - Static and Dynamic characteristics - Turn on and turn off methods, Rating and specifications of SCR, Series and Parallel connection of SCR, Applications of SCR	12
II	**POWER SEMI CONDUCTOR DEVICES-II:** DIAC: Construction, working and Characteristics, TRIAC: Construction, working and Characteristics, Unijunction Transistor: Construction, working and Characteristics, UJT as relaxation oscillators	10
III	**POWER SEMI CONDUCTOR DEVICES-III:** CHOPPERS: Basic chopper circuit, types of choppers step-down chopper, step-up chopper, operation of D.C. chopper circuits using self-commutation, cathode pulse turn-off chopper, load sensitive cathode pulse turn-off chopper (Jones Chopper), Morgan's chopper	11
IV	**Switching Circuits (Multivibrators):** Construction and working of: Astable Multivibrator, Monostable Multivibrator, Bistable Multivibrator, Comparison of different Multivibrators, Applications of Multivibrators, Schmitt Trigger (Emitter Coupled Binary) applications of Schmitt Trigger	12
V*	**Note:** A candidate is required to perform minimum five experimentsout of the list provided during course of study in this semester. 1. Characteristics of SCR 2. Characteristics of UJT 3. Characteristics of DIAC 4. Characteristics of TRIAC 5. UJT Relaxation Oscillator 6. Study of Astable multivibrator and plot the waveform 7. Study of Monostable Multivibrator and plot the waveform 8. Study of Bistable Multivibrator and plot the waveform 9. To observe and note down the output waveforms of Schmitt trigger using transistors 10. Study of triagular wave form generator using UJT.	30

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory 20 Marks** • Class Participation: **5 Marks** • Seminar/presentation/assignment/quiz/class test etc.: **5 Marks** • Mid-Term Exam: **10 Marks** ➢ **Practicum 10 Marks** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc.: **10 Marks** • Mid-Term Exam:	**End Term Examination:** 50 Marks 20 Marks

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Power Electronics, M.D.Singh & K.B.Khanchandani,TMH
2. Power Electronics, P.C.Sen,TMH
3. Power Electronics Circuits, Devices and Applications, 3rd Edition, M.H. Rashid, Pearson Education
4. Industrial electronics – G.K. Mithal, Khanna Publications – Delhi – 15thEd.1992.
5. Industrial and power electronics – C. Harish – Raj Umesh Publications – 4th Edn.1992.
6. Industrial and Power Electronics by G.K. Mithal
7. Integrated Electronics by Millman and Halkias, TMH
8. Electronic Devices and Circuits by Sanjeev Gupta, Dhanpat Rai Publicaions

Session: 2023-24			
Part A - Introduction			
Subject	ELECTRONICS		
Semester	SECOND		
Name of the Course	Basic Electronic Components & Devices		
Course Code	B23-ELE-203		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-M2		
Level of the course	100-199		
Pre-requisite for the course (if any)	Physics as a Subject at 4.0 Level (Class XII)		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: 1. Learn about active, Passive components and junction diode's 2. Understand the applications of junction diode and Zener diode 3. Understand the Concept of Bipolar Junction Transistor 4. Understand various R, L and C circuits 5. Practical exposure of the different active and passive components in their uses		
Credits	Theory	Practical	Total
	1	1	2
Contact Hours	15	30	45
Max. Marks: 50 (30 Theory + 20 Practical) **Internal Assessment Marks: 10 Theory + 5 Practical** **End Term Exam Marks: 20Theory + 15 Practical**		**Exam Time: 3 Hours each for Theory & Practical**	

Part B- Contents of the Course

Instructions for Paper- Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	**Passive Components:** Resistors, Capacitors, Inductors, Transformers, Relays, Fuses (their types & applications). **Junction Diodes:** Rectifying diode, Forward and reverse bias characteristics, Varactor Diode, Light Emitting Diode, Photo diode and Photo transistors (qualitative only).	4
II	**Rectifiers:** Half wave, Full wave, Bridge, Clipping and Clamping circuits. **Zener diode:** Zener diode as voltage regulator.	3
III	**Bipolar Junction Transistor:** Basic working principle, Input and Output Characteristics of CB & CE configurations. Transistor as an amplifier, Transistor as a switch.	4
IV	**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.	4
V*	**Note:** A candidate is required to perform minimum five experimentsout of the list provided during course of study in this semester. 1. Measurement of resistance value using colour codes and multimeter. 2. To study the V-I characteristics of PN junction diode. 3. To study the zener diode as voltage regulator. 4. To study HWR and measurement of ripple factor without filter. 5. To study FWR and measurement of ripple factor without filter. 6. To study diode as shunt clipping circuit. 7. To study diode as clamping element. 8. Study of CB characteristics. 9. Study of CE characteristics. 10. Measurement of voltage and Time period using CRO.	30

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory 10 Marks** • Class Participation: **4 Marks** • Seminar/presentation/assignment/quiz/class test etc.: • Mid-Term Exam: **6 Marks** ➢ **Practicum 5 Marks** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc.: **5 Marks** • Mid-Term Exam:	**End Term Examination: 20 Marks** **15 Marks**

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Integrated Electronics by Millman and Halkias.
2. Basic Electronics and Linear Circuits by NN Bhargava, DC Kulshreshtha (TTTI)
3. Electronics Devices and Circuit by Allen Mottershead
4. Basic Electronics SOLID STATE by B L Theraja

Session: 2023-24			
Part A - Introduction			
Subject	ELECTRONICS		
Semester	SECOND		
Name of the Course	Understanding of Mobiles and Computer Systems		
Course Code	B23-ELE-204		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	MDC-2		
Level of the course	100-199		
Pre-requisite for the course (if any)	B.A. & B.Com. Ist Sem.		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: 1. Identify the different parts of Computer or Laptop systems. 2. Know about various backup systems and cable connections 3. Learn about different printers available 4. Understand the Setting of Internet Connection with computer/Laptop systems 5. Hands-on with the different parts and peripherals of computer		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	30	30	60
Max. Marks: 75 (50 Theory + 25 Practical) Internal Assessment Marks: 15 Theory + 5 Practical End Term Exam Marks: 35 Theory + 20 Practical		Exam Time: 3 Hours each for Theory & Practical	

Part B- Contents of the Course

Instructions for Paper- Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit.
3. Medium of examination may be Hindi/English.

Unit	Topics	Contact Hours

I	Identification of various parts of Computer/ Laptop, Understanding the computer configuration/Laptop configuration and Mobile Configuration	8
II	Power Backup: Inverter, UPS, Dry Battery Various Interfacing Cables, connectors and converters for computer, Laptop and Mobile	8
III	Printer Scanner Configuration Projector: Types of Projectors and their Installation	7
IV	Setting Up of Internet Connection: Wired & Wi-fi Setting Up of a complete ICT solution using Computer/laptop and Mobile and interactive Panel	7
V*	**Note:** A candidate is required to perform minimum five experimentsout of the list provided during course of study in this semester. 1. Introduction of Computer Peripherals (input devices, output devices etc) 2. Disassembling computer system. 3. Reassembling computer system 4. Familiarization with Motherboard and its Components. 5. Troubleshooting and Repairing of Keyboard and Scanner. 6. Troubleshooting and Repairing of Printer 7. Troubleshooting and Repairing of Speaker and Web camera.	30

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory 15 Marks** • Class Participation: **4 Marks** • Seminar/presentation/assignment/quiz/class test etc.: **4 Marks** • Mid-Term Exam: **7 Marks** ➢ **Practicum 5 Marks** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc.: **5 Marks** • Mid-Term Exam:	**End Term Examination: 35 Marks** **20 Marks**

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Computer Fundamentals by Pradeep K. Sinha BPB Publications
2. IBM PC & Clones: Hardware Trouble Shooting and Maintenance by B.Govindarajalu, Tata McGraw Hill
3. PC Upgrade & Repair Bible , Wiley India.
4. PC Systems, Installation and Maintenance, Second Edition by R. P. Beales,
5. PC Upgrade & Repair Black Book by Ron Gilster.
6. Computer Installation and Servicing by D Balasubramanian