Ahsanullah University of Science and Technology
Bangladesh

COURSE OUTLINE

1. **Title**: Electronic Devices and Circuits

2. **Code**: EEE 2141

3. **Credit hours**: 3

4. **Level**: Year 2, Semester 1

5. **Faculty**: Engineering

6. **Department**: Electrical and Electronic Engineering (EEE)

7. **Programme**: B.Sc. in Computer Science and Engineering (CSE)

8. **Synopsis from the Approved Curriculum**:

Semiconductor Diode: Junction diode characteristics; Operation and small signal models of diodes. Bipolar Transistor: Characteristics; BJT biasing and thermal stabilization; CE, CB, CC configurations; Small signal low frequency h-parameter models and hybrid–Π model. Introduction to JFET, MOSFET and CMOS: Biasing and application in switching circuits. Oscillators: Hartley, Colpitts and Wien-bridge oscillators. Power Electronic Devices: SCR, TRIAC, DIAC, UJT characteristics and application; Introduction to rectifiers, active filters, regulated power supply; Introduction to IC fabrication techniques.

9. **Type of course (core/elective)**: **Core**

10. **Prerequisite(s) (if any)**: Basic Electrical Engineering (EEE 1241)

11. **Name of the instructor(s) with contact details and office hours**:

Tanvir Ahmad
Assistant Professor
Department of EEE
Room: 412
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Consultation hour: Monday: 1:00 pm to 3:30pm
And Tuesday: 10:30am to1:00pm

Sl. No.	COs	POs	Bloom's Taxonomy		
			C	A	P
1	Comprehend the basic concepts of fundamental semiconductor as well as power electronic devices such as Diodes, BJTs, FETs, OPAMPs, SCR, UJT etc. including their current voltage characteristics.	1	2		
2	Analyze important electronic circuits formed by several semiconductor and power semiconductor devices utilizing equivalent circuits or models and fundamental circuit theorems rather than memorizing equations.	2	4		
3	Construct MOSFET based logic circuits, comparators, active filters, amplifiers and several biasing circuits for various practical applications.	2	3		
4	Explain basic processes used to fabricate integrated circuits.	1	2		

14. Mapping of COs with Knowledge Profiles, Complex Engineering Problem Solving and Complex Engineering Activities

Course Outcome	Knowledge Profile	Complex Problem Solving	Complex Engineering Activities
CO1	***K3***	***P1-P7***	
CO2	***K2***	***P1-P7***	

16. Week wise distribution of contents and assessment methods

Week No.	Topics	Assessment Method(s)
1	Introduction and grading policy; Classification of solid based on band gap, Intrinsic and Extrinsic Semiconductors, p-type and n-type semiconductors, Formation of PN junction.	Quiz 1
2	PN junction in forward/reverse/no Bias, I-V characteristics and application of PN junction diode, Approximate diode models, Static and dynamic resistance, Temperature effect on diodes.	
3	Problems solving related to diode, Load line and Q point analysis and related problems.	
4	Applications of Clipper and Clamper circuits and analysis and design of clipper/clamper circuits.	
5	Zener diodes: Applications, Zener and avalanche breakdown, line and load regulations and related problems solving.	Quiz 2
6	Rectifiers: Half and full wave bridge rectifiers, Applications, efficiency and block diagram of a DC power supply.	
7	BJT classifications, modes of operation, Common emitter, common base and common collector configuration modes.	
8	BJT characteristics, construction and operation and problem solving on BJT, BJT as an amplifier and inverter.	Quiz 3
9	Biasing circuits: Fixed bias, Emitter stabilized bias and Voltage divider bias.	
10	Collector feedback, Relative β-stability configurations, Introduction to small signal low frequency h-parameter models and hybrid–Π model.	
11	Differences between BJT and FET. JFET characteristic, Enhancement type MOSFET, Depletion type MOSFET, CMOS and MOSFET based logic circuits.	Quiz 4
12	Op-Amp basic characteristics, Op-amp configuration, comparator, buffer, inverting and non-inverting amplifiers and problem solving.	
13	Passive and Active Filters, Oscillator circuits, SCR and UJT characteristics and basic power electronic devices.	
14	Half and full wave-controlled rectifiers, Basic IC Fabrication techniques.	

17. References

17.1. Required (if any)

1. Electronic Devices and Circuit Theory by Robert L. Boylestad, Louis Nashelsky, 10th Edition, Pearson.

16.2. Recommended (if any):

1. Microelectronic Circuits by Sedra Smith, Fifth Edition, Oxford.
2. Power Electronics Circuits, Devices and Applications by Muhammad H. Rashid, 3rd Edition.
3. Solid State Electronic Devices by Ben G. Streetman, Sanjay Banerjee, 6th Edition, Prentice Hall of India.