

**Department of Electronic Science, University of Delhi**

**Proposed UG Courses in Electronics/Electronic Science in NEP Framework**

**10.03.2022**

Papers	Semester	Credits (L-T-P)	Name of the Paper	Papers	Semester	Credits (L-T-P)	Name of the Paper
<b>FIRST YEAR</b>							
DSC - 1	I	3-0-1	Programming Fundamentals using Python	DSC - 4	II	3-0-1	Basic Instrumentation & Measurement Techniques
DSC - 2	I	3-0-1	Circuit Theory & Network Analysis	DSC - 5	II	3-0-1	Digital Electronics
DSC - 3	I	3-0-1	Semiconductor Devices	DSC - 6	II	3-0-1	Analog Electronics-I
GE-1	I	4 credits	Choose one from pool of GE courses	GE-2	II	4 credits	Choose one from pool of GE courses
AEC-1	I	2 credits	Choose one from pool of AEC courses	AEC-2	II	2 credits	Choose one from pool of AEC courses
VAC-1	I	2 credits	Choose one from pool of VAC courses	VAC-2	II	2 credits	Choose one from pool of VAC courses
<b>SEC-1 One Paper is to be selected out of the given three options</b>				<b>SEC-2 One Paper is to be selected out of the given three options</b>			
SEC-1	I	0-0-2	PCB Designing and Fabrication	SEC-2	II	0-0-2	Mobile Applications Development
SEC-1	I	0-0-2	CAD Designing	SEC-2	II	0-0-2	Data Engineering & Visualization
SEC-1	I	0-0-2	Web Development using MERN	SEC-2	II	0-0-2	Graphics Designing
<b>SECOND YEAR</b>							
DSC - 7	III	3-0-1	Engineering Mathematics	DSC - 10	IV	3-0-1	Electrical Technology
DSC - 8	III	3-0-1	Analog Electronics II	DSC - 11	IV	3-0-1	Microprocessor
DSC - 9	III	3-0-1	Signal and Systems	DSC - 12	IV	3-0-1	Communication Systems
AEC-3	III	2 credits	Choose one from pool of AEC courses	AEC-4	IV	2 credits	Choose one from pool of AEC courses
VAC-3	III	2 credits	Choose one from pool of VAC courses	VAC-4	IV	2 credits	Choose one from pool of VAC courses
<b>DSE-1 One paper is to be selected out of the given three options OR GE-3</b>				<b>DSE-2 One paper is to be selected out of the given three options OR GE-4</b>			
DSE-1	III	3-0-1	Artificial Intelligence & Machine Learning	DSE-2	IV	3-0-1	Internet of Things
DSE-1	III	3-0-1	Algorithm Design and Analysis	DSE-2	IV	3-0-1	Operating Systems
DSE-1	III	3-0-1	Mathematical Foundation for Computing	DSE-2	IV	3-0-1	Network Synthesis
<b>SEC-3 One Paper is to be selected out of the given three options OR IAPC</b>				<b>SEC-4 One Paper is to be selected out of the given three options OR IAPC</b>			
SEC-3	III	0-0-2	Digital System Design (VHDL)	SEC-4	IV	0-0-2	Internet and Java Programming
SEC-3	III	0-0-2	Programming with LABVIEW	SEC-4	IV	0-0-2	Game Development
SEC-3	III	0-0-2	Electronic Product Testing	SEC-4	IV	0-0-2	Multicore Programming

THIRD YEAR							
DSC - 13	V	3-0-1	Embedded System	DSC - 16	VI	3-0-1	Digital Signal Processing
DSC - 14	V	3-0-1	Electromagnetics	DSC - 17	VI	3-0-1	Photonics
DSC - 15	V	3-0-1	Basic VLSI Design	DSC - 18	VI	3-0-1	Semiconductor Device Technology
GE-5	V	4 credits	Choose one from pool of GE courses	GE-6	VI	4 credits	Choose one from pool of GE courses
<b>SEC-5 One Paper is to be selected out of the given two options OR IAPRC</b>				<b>SEC-6 One Paper is to be selected out of the given two options OR IAPRC</b>			
SEC-5	V	0-0-2	Cyber Security	SEC-6	VI	0-0-2	Robotic Programming and Automation
SEC-5	V	0-0-2	Arduino/RPi App Development	SEC-6	VI	0-0-2	3D Scanning and Printing
<b>DSE-3 One paper is to be selected out of the given three options</b>				<b>DSE-4 One paper is to be selected out of the given four options</b>			
DSE-3	V	3-0-1	Medical Electronics & Instrumentation	DSE-4	VI	3-0-1	Computer Networks
DSE-3	V	3-0-1	Quantum and Spintronics Devices%	DSE-4	VI	3-0-1	Advance Computer System Architecture
DSE-3	V	3-0-1	Telecommunication Switching Systems and Networks	DSE-4	VI	3-0-1	Transmission lines, Antenna and Wave Propagation
				DSE-4	VI	4-0-0	Research Methodology**
				** If a student wishes to pursue four years Honours Degree with research, it is compulsory to opt for Research Methodology paper.			
FOURTH YEAR							
DSC - 19	VII	3-0-1	Control Systems	DSC -20	VIII	3-0-1	Power Electronics
<b>Three DSE courses OR Two DSE and one GE OR One DSE and two GE</b>				<b>Three DSE courses OR Two DSE and one GE OR One DSE and two GE</b>			
DSE-5	VII	3-0-1	Stream A/B/C/D/E*	DSE-8	VI	3-0-1	Stream A/B/C/D/E*
DSE-6	VII	3-0-1	Stream A/B/C/D/E*	DSE-9	VI	3-0-1	Stream A/B/C/D/E*
DSE-7	VII	3-0-1	Stream A/B/C/D/E*	DSE-10	VI	3-0-1	Stream A/B/C/D/E*
Dissertation on Major(6 credit) OR Dissertation on Minor(6 credit) OR Academic Project/ Entrepreneurship (6 credit)				Dissertation on Major(6 credit) OR Dissertation on Minor(6 credit) OR Academic Project/ Entrepreneurship (6 credit)			

**#Analog Electronics paper in First Year should cover Applications of Diode, BJT and MOSFET.**

**Internship option- Installation and Maintenance of Consumer Electronics Products Industry**

IAPC- Internship/Apprenticeship/Project/Community Outreach

IAPRC- Internship/Apprenticeship/Project/Research/Community Outreach

\*DSE in VII and VIII Semester (DSE 5-10) will be aligned streamwise as under so that student can specialize in a particular domain of Electronics. Accordingly, student can do his Major dissertation in that domain. Thus, students will select one of the five streams in VII Semester and study DSE courses of that stream in VII and VIII semesters.

<b>Stream A</b>	<b>Stream B</b>	<b>Stream C</b>	<b>Stream D</b>	<b>Stream E</b>
<b>Signal Processing and Machine Learning</b>	<b>RF and Communication Systems</b>	<b>Circuits and VLSI</b>	<b>Controls and Embedded System</b>	<b>Nanotechnology</b>
<b>VII</b>	<b>VII</b>	<b>VII</b>	<b>VII</b>	<b>VII</b>
<ul style="list-style-type: none"> <li>• Statistical Signal Processing</li> <li>• Image Processing Techniques</li> <li>• Advance Machine Learning</li> </ul>	<ul style="list-style-type: none"> <li>• Digital Communication System</li> <li>• Antenna Theory and Design</li> <li>• RF Circuit Design</li> </ul>	<ul style="list-style-type: none"> <li>• Digital VLSI Design</li> <li>• Memory Design</li> <li>• Low Power Design</li> </ul>	<ul style="list-style-type: none"> <li>• Digital Control for Automation</li> <li>• Smart Sensor System</li> <li>• Advance Embedded Logic Design</li> </ul>	<ul style="list-style-type: none"> <li>• Recent Trends in nanoscience and nanotechnology</li> <li>• Science and Technology of Thin Films</li> <li>• Synthesis and Characterization techniques for nanomaterials</li> </ul>
<b>VIII</b>	<b>VIII</b>	<b>VIII</b>	<b>VIII</b>	<b>VIII</b>
<ul style="list-style-type: none"> <li>• Soft Computing</li> <li>• Deep Learning</li> <li>• Adaptive Signal Processing</li> </ul>	<ul style="list-style-type: none"> <li>• Optical Communication System</li> <li>• Mobile Communication</li> <li>• Wireless Communication</li> </ul>	<ul style="list-style-type: none"> <li>• System on Chip Design and Test</li> <li>• CAD for VLSI</li> <li>• Mixed Signal Design</li> </ul>	<ul style="list-style-type: none"> <li>• Optimal Control Theory</li> <li>• Medical Diagnostic Devices</li> <li>• SCADA System &amp; Application</li> </ul>	<ul style="list-style-type: none"> <li>• Nanoengineered Materials</li> <li>• Nanotechnology for Sustainable Energy</li> <li>• Introduction to MEMS</li> </ul>

## GE POOL

**DSC and DSE running in the ongoing semesters can be offered as GE**

<p style="text-align: center;"><b>Sem I GE 1 (Any One)</b></p> <ol style="list-style-type: none"> <li>1. Fundamentals of Electronics</li> <li>2. Data Engineering and Analytics</li> </ol>	<p style="text-align: center;"><b>Sem II GE 2 (Any One)</b></p> <ol style="list-style-type: none"> <li>1. Digital System Design</li> <li>2. Data Visualization Techniques</li> </ol>
<p style="text-align: center;"><b>Sem III DSE/GE 3 (Any One)</b></p> <ol style="list-style-type: none"> <li>1. Practical Electronics</li> <li>2. Modelling and Simulation</li> </ol>	<p style="text-align: center;"><b>Sem IV DSE/GE 4 (Any One)</b></p> <ol style="list-style-type: none"> <li>1. Instrumentation</li> <li>2. Mobile Application Development (L:P-1:3)</li> </ol>
<p style="text-align: center;"><b>Sem V GE 5 (Any One)</b></p> <ol style="list-style-type: none"> <li>1. Microprocessor System</li> <li>2. Artificial Intelligence</li> </ol>	<p style="text-align: center;"><b>Sem VI GE 6 (Any One)</b></p> <ol style="list-style-type: none"> <li>1. Microcontroller Systems</li> <li>2. Internet of Things</li> </ol>
<p style="text-align: center;"><b>(Max Two)</b></p> <p style="text-align: center;"><b>Sem VII DSE/GE 7</b></p> <p style="text-align: center;"><b>Sem VII DSE/GE 8</b></p> <p style="text-align: center;"><b>Sem VII DSE/GE 9</b></p> <ol style="list-style-type: none"> <li>1. Arduino/RPi App Development (L:P-2:2)</li> <li>2. Neural Networks</li> <li>3. Robotics</li> </ol>	<p style="text-align: center;"><b>(Max Two)</b></p> <p style="text-align: center;"><b>Sem VIII DSE/GE 10</b></p> <p style="text-align: center;"><b>Sem VIII DSE/GE 11</b></p> <p style="text-align: center;"><b>Sem VIII DSE/GE 12</b></p> <ol style="list-style-type: none"> <li>1. Communication Systems</li> <li>2. Embedded System</li> <li>3. Nanoelectronics</li> </ol>

### **Value Added Courses (2 Credits)**

#### **1. Digital Age Literacy**

The reach and the dynamic nature of digital technologies influence all aspects of the teaching-learning process. The current generation of undergraduate learners has grown up with these technologies and can be regarded as the first generation of ‘digital natives.’ These digital natives must be trained to be able to understand, work with and benefit from these technological innovations landscape. A curriculum that enables students to understand digital media content and applications is essentially required. It will empower them to create knowledge and capacity in a manner that is respectful of the rights of the other users.

The curriculum may comprise the following units:

- Fundamentals of Digital Technologies
- Digital Citizenship in a Global World
- Digital Communication and Collaboration
- Data Policy Issues
- Information Literacy for Academic Research
  - How to execute an effective search of academic information, find facts and figures, know Open Access and Internet search engines, and basic knowledge of scholarly communication and norms.
  - Security, Safety and Privacy issues in the Digital age

## **2. Industry 1.0 to Industry 5.0: A Panoramic View**

The paper will discuss the journey of human technological development and innovations in chronological order starting from ancient times to Industrial revolution(Industry 1.0) followed by the ages defined as Technological revolution(Industry 2.0), Digital revolution(Industry 3.0), Automation revolution(Industry 4.0) to amalgamation of creativity and technology called as Industry 5.0 with emphasis on our rich Indian Knowledge based system in all these eras, It will help students identify and applaud our rich knowledge heritage. The paper will discuss the present challenges and opportunities in technology and innovation for India to become Atmanirbhar and thus a global leader.