	<b>Unit-I:</b> Electronic Transport in semiconductor, PN Junction, Diode equation and diode equivalent circuit. Breakdown in diodes, Zener diodes, Tunnel diode, Semiconductor diodes, characteristics and equivalent circuits of BJT, JFET, MOSFET, IC fabrication-crystal growth, epitaxy, oxidation, lithography, doping, etching, isolation methods, metalization, bonding, Thin film active and passive devices.
	<b>Unit-II:</b> Superposition, Thevenin, Norton and Maximum Power Transfer Theorems, Network elements, Network graphs, Nodal and Mesh analysis, Zero and Poles, Bode Plots, Laplace, Fourier and Z-transforms. Time and frequency domain responses. Image impedance and passive filters. Twoport Network Parameters. Transfer functions, Signal representation. State variable method of circuit analysis, AC circuit analysis, Transient analysis.
	<b>Unit-III:</b> Rectifiers, Voltage regulated ICs and regulated power supply, Biasing of Bipolar junction transistors and JFET. Single stage amplifiers, Multistage amplifiers, Feedback in amplifiers, oscillators, function generators, multivibrators, Operational Amplifiers (OP AMP) - characteristics and Applications, Computational Applications, Integrator, Differentiator, Wave shaping circuits, F to V and V to F converters. Active filters, Schmitt trigger, Phase locked loop.
	<b>Unit-IV:</b> Logic families, flip-flops, Gates, Boolean algebra and minimization techniques, Multivibrators and clock circuits, Counters-Ring, Ripple. Synchronous, Asynchronous, Up and down shift registers, multiplexers and demultiplexers, Arithmetic circuits, Memories, A/D and D/A converters.
	<b>Unit-V:</b> Modulation index, frequency spectrum, generation of AM (balanced modulator, collector modulator), Amplitude Demodulation (diode detector Other forms of AM: Double side band suppressed carrier, DSBSC generation ( balanced modulator), Single side band suppressed carrier, SSBSC generation (filter method, phase cancellation method, third method), SSB detection, Frequency and Phase modulation, modulation index and frequency spectrum, equivalence between FM and PM, Generation of FM (direct and indirect methods), FM detector (slope detector)

## **18. SPECIAL CENTRE FOR DISASTER RESEARCH**

The pattern of JNUEE 2022-23 will be based on Multiple Choice Questions (MCQs) through Computer Based Test

(CBT)

Ph.D.
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SI. No.	Name of Centre	Sub. Code & Sub. Code (Number)	Syllabus for Entrance Examination
1	Special Centre for Disaster Research (SCDR)	Disaster Studies - DSSH (911)	Syllabus for Entrance Exam: PART A: Research Methodology in Disaster Studies, Surveys, Statistical Tools & Analysis, Data Collection and Management, Research approaches (qualitative and quantitative), Techniques of pre and post-disaster needs assessment (PDNA), Comparative Case Study Methods for evaluating governance and community capacity for last mile service delivery. Ethics in research.
			<ol> <li>PART B:</li> <li>Constitutional Law, Indian Law and International Law related to Disasters; Theories and Practices related to Governance, International Law and Practice, Theory and Practice related to legal regime on Environment, Human Rights and Development, Implementation of Disaster Risk Reduction and Disaster Risk Governance Policies.</li> </ol>

	2.	Social Sciences and Anthropology of Disasters; Vulnerable communities in fragile environmental and ecological regions; Geography, Environment and Disasters; Geospatial Mapping and human security. Role of NGOs, INGOs in disaster management and role of humanitarian agencies and humanitarian aid. Man-made disasters- war and conflict.
	3.	Disaster Economics, Planning and Preparing against economic losses, Role of Macro and Micro level economic institutions.
	4.	Database, Artificial Intelligence and Early Warning Systems in the management of rescue and relief operations.
	5.	Public Health and Disasters, Health Emergencies and Disasters, Pandemics and Public Health Response, Occupational Health and Safety, Environmental Health issues.

## 19. Special Centre for National Security Studies (SCNSS)

## The pattern of JNUEE 2022-23 will be based on Multiple Choice Questions (MCQs) through Computer Based Test (CBT)

SI. No.	Name of Centre	Sub. Code & Sub. Code	Syllabus for Entrance Examination
		(Number)	
1	Special	National	1. Domestic/Internal Security Studies of India
	Centre for	Security Studies	a. Insurgencies in the North East
	National	– NSSH (916)	b. Left Wing Extremism
	Security		c. Terrorism in Heartland
	Studies		d. Coastal Security
	(SCNSS)		2. External Security Studies of India
			a. India-Pakistan-China Military Balance
			b. International Terrorism
			c. Manume Security
			a. Nuclear destring regime 8 accurity
			e. Nucleal doctille, regime & security
			3. Indian Strategic Thoughts and Military History of India
			a. Kautilva's Arthashastra
			b. The Kural
			c. Kamandaka's Nitishastra
			d. Panchtantra and Hitopdesa
			e. India-Pakistan War of 1965, 1971, 1999
			f. India-China Border War of 1962
			<ol><li>Emerging Technology and National Security</li></ol>
			a. <b>S</b> cience and Technology and National Security
			b. Science Diplomacy
			c. Biological Warfare, Chemical Warfare, Cyber warfare
			d. Artificial Intelligence, Genetic Engineering, Quantum Computing,
			Nanotechnology, Unmanned Aerial Venicles
			5. Studies of External Dorder of India
			a. Frontiers & Doundanes h Border disputes
			c India-Pakistan border
			d. India-Bandladesh border
			e. India-China border
			f. India-Myanmar border
			g. India-Nepal border
			h. Maritime border

## Ph.D.