			Political Economy of Care, Discrimination on the basis of Caste, Gender and Community, Common Property Resources, Public Policies in the Unorganised Sector, and Sustainable Development. The objective of the programme is to enable students to understand the linkages between the formal and the informal sectors and between theory and empirical investigations in research work.

5. SCHOOL OF ENVIRONMENTAL SCIENCES

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

Ph.D.

Sl. No.	Name of School	Sub. Code & Sub. Code Number	Syllabus for Entrance Examination
1	School of Environmental Sciences (SES)	Research Area I- ONEH (885)	All questions would be of the multiple choice type. The questions will be divided into two parts: **Part-A** This part will have questions on Research Methodology broadly covering the topics such as Judging the ability of Searching libraries, web-based information etc., Structuring of articles, referencing etc., Describing visual, audio or written images, Writing review of book/Report etc., importance of seminar/workshop/conference, General idea of plagiarism, Concept of logbook, workbook, field book etc., Names of journals, Important publishers, Site selection criteria, sample number criteria, sample storage methods, sample extraction and digestion methods, Mean, median, mode, standard deviation, standard error, correlation, time series, scatter plots, bars, line diagram, error bars, area plots, contours etc., Accuracy, precision, null hypothesis, errors, uncertainty, Knowledge about software: statistical, GIS and RS etc. **Part-B** This part will have questions of M.Sc. level from Physics, Chemistry, Geology, Biology and Environmental Sciences.
2		Research Area II- TWOH (886)	
3		Research Area III- THRH (887)	
4		Research Area IV- FORH (888)	

6. SCHOOL OF COMPUTER & SYSTEMS SCIENCES

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

Ph.D.

The School will have two separate streams namely "Computer Science' stream and "Microsystems" stream in the JNU entrance examination for the admissions to the PhD programme. An applicant for the PhD programme should clearly mention only one stream in the application form. The candidature of those applying for both the streams is likely to be rejected. Therefore, the applicants are advised in their own interest not to apply for both the streams. Admission is offered to candidates based on their performance in the Computer Based Test (*CBT*) and the viva-voce examination, as per University rules. In the entrance examination, besides the common part (PART A), the applicants must answer questions only for the part meant for their choice of stream (PART B). On the basis of the candidates' performance in the entrance examination and as per University rules, the candidates would be called for the viva-voce examination. Separate viva-voce

examination would be conducted for "Computer Science' stream and "Microsystems" stream. Admission to the PhD Programme will be based on the merit in entrance and viva-voce examination.

Sl. No.	Name of School	Sub. Code & Sub. Code (Number)	Syllabus for Entrance Examination
1	School of Computer & Systems Sciences (SC&SS)	Computer Science - SCSH (890) Microsystems - MISH (915)	50% of the questions will be from Research Methodology and remaining from the other specified topics. **PART A** **Common Syllabus for the Computer Science and Microsystems Stream:** **Research Methodology:** Experimental Design; Fundamentals of Sampling; Data: types, quality measurement; Processing and Analysis of data; Hypothesis Testing (parametric, non-parametric), Theory of Probability. **Mathematics:** Integral and Differential Calculus, Linear Algebra, Numerical Analysis, Modern Algebra. **PART B** **Specific Syllabus for the Computer Science Stream**: Data Structures and Algorithms, Programming Languages (C, C++), Operating Systems, Discrete Mathematics, Automata Theory, Computer Architecture, Computer Networks, Database Management System. **Specific Syllabus for the Microsystems Stream**: Digital logic, electrons in solids, energy band theory, charge carriers in semiconductors, drift-diffusion theory, p-n junctions, MOS transistor, Basics of CMOS analog circuits, Basics of CMOS digital VLSI circuits, Basics of MEMS and VLSI Technology.

7. SCHOOL OF PHYSICAL SCIENCES

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

Ph.D.

Sl. No.	Name of School	Sub. Code & Sub. Code Number	Syllabus for Entrance Examination
1	School of Physical Sciences (SPS)	Mathematical Sciences – MATH (897)	**Analysis:** The structure of the real numbers as an ordered field with the least upper bound property, archimedean property, Bolzano-Weierstrass theorem, Heine-Borel theorem, extended real number system, complex field, Euclidean spaces. Definition and examples of metric spaces, completeness, compactness, connectedness, continuous functions and related properties. Convergence of sequences in a metric space, subsequences, Cauchy sequences. Limits of functions, continuity of functions, uniform continuity, continuity and compactness, continuity and connectedness. Pointwise and uniform convergence, uniform convergence and continuity, uniform convergence and integration, uniform convergence and differentiation, equicontinuity, Arzela-Ascoli theorem, Stone-Weierstrass theorem. Differentiation of functions of several real variables (directional derivatives, partial derivatives, differentiability and the total derivative, chain rule, Jacobian, higher derivatives, interchange of the order of differentiation, Taylor's theorem), inverse function theorem, implicit function theorem, rank theorem, differentiation of integrals. Lebesguemeausre and Lebesgue integral, convergence Theorems. **Linear Algebra:** Vector Spaces, subspaces, linear independence, bases, dimension, algebra of linear transformations, rank-nullity theorem, dual spaces, double dual, eigenvalues and eigenvectors, characteristic polynomial and minimal polynomial, Cayley-Hamilton