

			<p><i>Product formation kinetics</i> <i>Continuous reactor systems with recycle</i> <i>Fed batch reactors</i> <i>Feed design in fed batch reactors and its analysis</i> <i>Heat transfer in bioreactors</i> <i>Mass transfer in bioreactors: Concept K_La</i> <i>K_La estimation methods</i> <i>Scale up principles</i></p> <p><u><i>Downstream Processing</i></u></p> <p><i>Thermodynamic requirements of separation . Classification of separation processes – equilibrium and non-equilibrium processes. Chief characteristics of bio-separation processes. RIPP – removal of in-solubles , isolation of products, purification and polishing.</i> <i>Cell harvesting – Cell disruption – ball mill, chemical lysis, homogenization, selection of unit operation for insoluble removal . Centrifugation – general theory of centrifugation – final settling velocity, critical particle diameter, sigma factor. Types of centrifuges: tubular bowl, disc stack, basket, Sharples super-centrifuge. Theory of disc-stack centrifuges. Filtration . Types of filtration –rotary vacuum drum, plate and frame , leaf filters. Compressible cakes and filter aids. Theory of filtration .</i> <i>Product isolation – extraction, principle of extraction, partition coefficient, extraction factor, batch extraction, cascades , idealized stage operation, differential extraction, height of a transfer unit ,number of transfer units ,adsorption, adsorption isotherms ,batch adsorption, adsorption in a CSTR.</i> <i>Product Purification – Chromatography, yield and purity and resolution</i> <i>Principles of elution chromatography, ion-exchange, hydrophobic interaction, reverse-phase chromatography, gel-filtration chromatography. The concept of resolution, plate height. Protein purification. Synthesis of chromatography trains.</i> <i>Membrane filtration: tangential flow filtration , micro-filtration , ultra-filtration , reverse osmosis. Transport equations, gel layer formation, osmotic pressure. Time required for filtration in T.F.F.</i> <i>Polishing - Crystallization – separation, purity, nucleation, crystal growth, characteristic length, crystal size distribution, dominant crystal length.</i> <i>Lyophilisation and drying.</i> <i>Scale –up: Basic ideas of scale –up , Geometric , Kinematic, Dynamic similarity. Why scale up of bioprocesses is difficult? Typical time constants for mixing, kinetic, heat transfer, mass transfer phenomena in bioreactor. Criteria for scale-up P/V, k_La , N, rules of thumb .</i></p>
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11. SCHOOL OF SANSKRIT AND INDIC STUDIES

The pattern of JNUEE 2020-21 will be based on Multiple Choice Questions (MCQs) through Computer Based Test (CBT)

SYLLABUS

I. REGULAR COURSES

B.Sc.-M.Sc. Integrated program in Ayurveda Biology

Sl. No.	Name of Centre	Sub. Code & Sub. Code Number	Syllabus for Entrance Examination
1	School of Sanskrit and Indic Studies (SSIS)	Ayurveda Biology - AYBU (411)	Syllabus: The syllabus is 10+2 level CBSE for Sanskrit, Science and General Aptitude questions.

M.A.

Sl. No.	Name of Centre	Sub. Code & Sub. Code Number	Syllabus for Entrance Examination
1	School of Sanskrit and Indic Studies (SSIS)	Sanskrit – SANM (228)	Syllabus: Test may cover the following areas: Vedic & Agamic Studies, Sanskrit language and literature, Indian Philosophical Systems, Sanskrit Poetics and Aesthetics, Sanskrit and Modern Indian Languages, Sanskrit Linguistics including Computational Linguistics, Indian Intellectual and Cultural Traditions, Social thought, Polity, Economy, Architecture, Fine Arts, Environmental Awareness, Sanskrit Grammar, Indian Logic, Astronomy and Mathematics, Science and Technology, Argumentation and Interpretation, and Role and Place of Sanskrit in Indo European Studies.

M.Phil & Ph.D.

Sl. No.	Name of Centre	Sub. Code & Sub. Code Number	Syllabus for Entrance Examination
1	School of Sanskrit and Indic Studies (SSIS)	Sanskrit Studies – SANP (170) & SANH (906)	Syllabus: The test will cover the following areas: Indian Philosophical Systems; Traditions of Yoga & Sādhanā, Sanskrit literature and Poetics; Sanskrit Grammar and Grammatical Theory; Modes of Disputation and Interpretation of Texts; Sanskrit Linguistics including Computational Linguistics; Vedic, Agamic and Purānic Studies; Pali and Prakrit Studies; Indian Social Thought, Religious Studies; Sanskrit Manuscriptology; Issues in Sanskrit Studies and Researches; Research Methodology & Research Aptitude.

II. Part-time Courses

Sl. No.	Name of Centre	Sub. Code & Sub. Code Number	Syllabus for Entrance Examination
1	School of Sanskrit and Indic Studies (SSIS)	Pali – PALC (705)	Candidates seeking admission shall be examined on the basis of the Computer Based Test (CBT). The questions shall be objective type and shall be within the broad spectrum of General Knowledge, general aptitude for the subject and English Language.
2		Sanskrit Computational Linguistics – SCLC (706)	
3		COP in Yoga Philosophy – YOPC (707)	
4		COP in Vedic Culture – VECC (708)	
5		COP in Sanskrit – SANC (709)	