

Virtual Lab Mapping for B. Tech in Food Technology – 4th Semester

Subject Code	Subject Name	List of Experiments	V-lab
ES-FT 491	Unit Operation Lab	<ol style="list-style-type: none"> 1. Experiments on Reynolds's Apparatus –Determination of flow regime and construction of friction factor against NRE 2. Experiments on flow measuring device — in closed conduit using (a) Venturimeter, (b) Orifice meter, (c) Rotameter. 3. Determination of Pressure drop for flow through packed bed & verification of Ergun Equation, Kozeny-Karman equation, Blake-Plummer Equation. 4. To study the working characteristics of a Jaw Crusher, calculate the energy consumption as a function of size reduction and compare it with the actual energy requirements. 5. To study the working characteristics of a Ball Mill, calculate the energy consumption as a function of size reduction and determine the critical speed. 6. To Determine the Overall heat transfer coefficient of a concentric pipe heat exchanger based on the inside diameter of the tube. 7. To study the characteristics of film-wise/drop-wise condensation. 	<p>http://uorepc-nitk.vlabs.ac.in/exp1/index.html</p> <p>https://www.che.iitb.ac.in › filesPDF FM 308 - Flow Measurement by Venturi and Orifice mete</p> <p>http://uorepc-nitk.vlabs.ac.in/exp5/index.html https://nptel.ac.in/content/storage2/courses/103104043/Lecture_pdf/Lecture30.pdf</p> <p style="text-align: center;">.-</p> <p>- https://www.911metallurgist.com › ...PDF Capacities and performance characteristics of jaw crushers</p> <p>https://www.google.co.in/url?sa=t&source=web&rct=j&url=https://www.mdpi.com/1996-1944/10/8/882/pdf&ved=2ahUKewiqqsev47pAhWkxDgGHWNWBcUQFjAQegQIBxAB&usg=AOvVaw05YDNEgyWGVlITYFG8x2fjz&cshid=1591501123803</p> <p>http://vlab.amrita.edu/?sub=62&brch=176&sim=1155&cnt=2 http://ce-iitb.vlabs.ac.in/exp8/Theory.html?domain=Chemical%20Engineering&lab=Chemical%20Engineering%20Lab</p> <p>https://www.scribd.com/document/349498178/Dropwise-and-filmwise-condensation-pdf https://www.researchgate.net/publication/226909092_Film-wise_and_drop_wise_condensation_of_steam_on_short_inclined_plates/link/0deec52ca8900365b600000/download</p> <p>Filtration : a) Filter press: https://youtu.be/8eFBoYVTLTI</p>

		<p>8. Separation: Filtration, centrifugation</p> <p>9. Mass transfer coefficient / $k_L a$ determination</p> <p>10. Determination of Distillation efficiency in a sieve plate distillation column.</p> <p>11. Differential distillation and verification of Rayleigh's Equation</p> <p>12. Liquid liquid mixing</p>	<p>b) vacuum filtration: https://youtu.be/SgQK0jauYfg</p> <p>c) suction filtration: https://youtu.be/fsGmgmtMsMXQ http://www.stalke.chemie.uni-goettingen.de/virtuelles_labor/videos/2010-10-19%20Filtration.mp4</p> <p>Centrifugation http://www.stalke.chemie.uni-goettingen.de/virtuelles_labor/videos/2010-10-18%20Zentrifugation.mp4</p> <p>https://www.researchgate.net/publication/253239089_Experimental_Determination_of_the_Volumetric_Mass_Transfer_Coefficient/link/02e7e51f749adb03ad000000/download</p> <p>https://youtu.be/L8Tsibn31ac https://youtu.be/QVud_HqDBIw https://youtu.be/xJzbWplU8-c</p> <p>https://www.scribd.com/document/81105365/Sieve-Plate-Distillation</p> <p>https://www.google.co.in/url?sa=t&source=web&rct=j&url=https://www.che.iitb.ac.in/online/system/files/92/course_details/MT%2B302_Differential%2BDistillation.pdf&ved=2ahUKEwizoOP94e7pAhXAzigGHWCeC-0QFjABegQIAhAB&usg=AOvVaw1L5nUUNo10mjXGECW_aPbec&cshid=1591500682165</p>
ES-FT 492	Biochemistry Lab	<p>1. Separation of amino acids/sugars by Ascending Paper Chromatography.</p> <p>2. Separation of sugars/ lipids by Thin Layer Chromatography.</p>	<p>http://ifs.olabs.co.in/?sub=73&brch=8&sim=133&cnt=1 https://www.youtube.com/watch?v=8wmQ_xWqZbo https://amrita.olabs.edu.in/?sub=79&brch=17&sim=124&cnt=2 https://amrita.olabs.edu.in/?sub=79&brch=17&sim=124&cnt=4</p> <p>https://www.virtual-labs.leeds.ac.uk/brewing/TLCtheory.php https://elearning.cpp.edu/learning-objects/organic-chemistry/tlc/?page=simulation.html http://vlab.amrita.edu/?sub=3&brch=63&sim=154&cnt=1 https://www.youtube.com/watch?v=qdmKGskCyh8 https://www.youtube.com/watch?v=ED8LHLQjvWU https://www.youtube.com/watch?v=tDaKxskUwA0</p>

		<ol style="list-style-type: none"> 3. Separation and isolation of proteins/amino acids by Paper Electrophoresis. 4. Determination of BOD5 and COD of a sample of waste water. 5. Preparation of cell-free extract: Bacterial cell by sonication, Chicken liver by homogenization. 6. Assay of enzyme activity – (a) Phosphatase assay [Chicken liver] (b) Protease assay 7. Study of an enzymatic reaction. 	<p> https://www.youtube.com/watch?v=kLNn84MOHOE https://www.youtube.com/watch?v=GyO1FQFM_OE https://www.youtube.com/watch?v=kmJowrMbNhk https://www.youtube.com/watch?v=91CXI-X9Gc4 </p> <p> http://vlab.amrita.edu/index.php?sub=3&brch=272&sim=1413&cnt=1 http://vlabs.iitb.ac.in/vlabs-dev/labs/nitk_labs/Environmental_Engineering_1/experiments/determination-biological-oxygen-demand-nitk/theory.html https://www.youtube.com/watch?v=V16USbjKZXw http://web.iitd.ac.in/~arunku/files/CVL212_Y17/LabCVL212Jan_18.pdf </p> <p> https://dnalc.cshl.edu/view/15885-Cell-free-extracts.html https://www.youtube.com/watch?v=jwar4H-rvY8 https://www.youtube.com/watch?v=laoVd44flxA </p> <p> https://vlab.amrita.edu/?sub=3&brch=64&sim=1090&cnt=6 https://www.youtube.com/watch?v=7NU1Rur3jBk https://www.youtube.com/watch?v=txsi-kWC0cc https://www.youtube.com/watch?v=sT1bPtboEKY </p> <p> https://www.labster.com/simulations/enzyme-kinetics/ http://www.phschool.com/science/biology_place/labbench/lab2/intro.html https://www.youtube.com/watch?v=EqW29xD3VIg </p>
BS-FT 491	Numerical Method Lab	<ol style="list-style-type: none"> 1. Assignments on Newton forward /backward, Lagrange's interpolation 2. Assignments on numerical integration using Trapezoidal rule, Simpson's 1/3 rule, Weddle's rule 3. Assignments on numerical solution of a system of linear equations using Gauss elimination and Gauss-Seidel iterations 4. Assignments on numerical solution of Algebraic Equation by Regular-falsi and Newton Raphson 	<p> http://vlabs.iitb.ac.in/vlabs-dev/labs/numerical_lab/labs/explicit.php </p>

		<p>methods</p> <ol style="list-style-type: none">5. Assignments on ordinary differential equation: Euler's and Runge-Kutta methods.6. Introduction to Software Packages: Matlab / Scilab / Labview / Mathematica7. Generate Various types of DOE using Minitab, /Design Expert8. Perform regression analysis using Minitab,/Design Expert /SPS9. Construct graphical displays of science/engineering data and interpret the role of such displays in data analysis10. Assignment on performing ANOVA for a given data11. Perform sensory evaluation for a food product using fuzzy logic	
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Virtual Lab Mapping for B. Tech in Food Technology – 6th Semester

Subject Code	Subject Name	List of Experiments	V-lab
FT 691	Food Processing Lab – II	<ol style="list-style-type: none"> 1. Preparation of dry onion/ chilli/ garlic. 2. Preparation of bread 3. Manufacture of macaroni by extruder. 4. Manufacture of potato powder. 5. Manufacture of ice cream. 6. Manufacture of Rosogolla and Sandesh. 	<p>Theories of drying and dehydration: https://books.google.co.in/books?id=gj85DwAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false https://www.alliedacademies.org/articles/recent-advances-in-conventional-drying-of-foods.pdf https://www.youtube.com/watch?v=k-KHRJkVaGI https://www.youtube.com/watch?v=6FtIn8nW_dc</p> <p>Tray dryer construction and operation: https://www.youtube.com/watch?v=vvZ7HICmlkQ</p> <p>Operating principle of tray dryer: https://www.youtube.com/watch?v=m1Ge0A4Trkg</p> <p>The bread-making process: https://www.youtube.com/watch?v=S_KygwCOWSQ https://www.youtube.com/watch?v=ha-EUWESZtw</p> <p>Straight dough process: https://www.youtube.com/watch?v=bWLMlxfXQes</p> <p>Sponge and dough process: https://bakerpedia.com/processes/sponge-and-dough/</p> <p>Chorleywood continuous bread process: https://www.youtube.com/watch?v=BI85pCb2UEU</p> <p>Theories pasta extrusion: https://books.google.co.in/books?id=VM3gBwAAQBAJ&pg=PA448&lpg=PA448&dq=pasta+and+macaroni++formulation+google+book&source=bl&ots=pxaqIBiTLE&sig=ACfU3U0T6JXGSTyi4ycLj6q5GkTn0KXpdQ&hl=en&sa=X&ved=2ahUKEwjSs9mRh-_pAhUMfx0KHQURc744ChDoATAlegQIAhAB#v=onepage&q=pasta%20and%20macaroni%20%20formulation%20google%20book&f=false</p> <p>Preparation of dough and basic extruder operation: https://www.youtube.com/watch?v=54LMhS2EUPI</p> <p>https://www.youtube.com/watch?v=FhmwdFautD4</p> <p>https://www.youtube.com/watch?v=IO6DiuUAvil</p> <p>Rasogolla: https://www.youtube.com/watch?v=O2De6-ro6Ew</p> <p>Sandesh: https://www.youtube.com/watch?v=9tbAYwPtvv8</p>

		<p>7. Manufacture of candied fruits.</p> <p>8. Production of dried milk by drum drying</p> <p>9. Production of milk powder by spray drying</p> <p>10. Preparation of sponge cake</p>	<p>Theories: https://books.google.co.in/books?id=XH9gKJjZmTgC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false Manufacturing process: https://www.youtube.com/watch?v=Im7IMcoCDms</p> <p>Theory: https://books.google.co.in/books?id=E5o_jgEACAAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false Plant process: https://www.youtube.com/watch?v=NEy23tfypCc https://www.youtube.com/watch?v=-AkwigwE5pg</p> <p>Theory: https://books.google.co.in/books?id=E5o_jgEACAAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false Processing and technology: https://www.youtube.com/watch?v=KL4-SpP-Ghk</p> <p>https://www.youtube.com/watch?v=a0LCeby6fdY</p>
FT 692	Microbial Technology Lab	<p>1. Alcohol fermentation</p> <p>2. Organic acid fermentation – Vinegar / citric / lactic acid production</p> <p>3. Propagation of baker's yeast</p> <p>4. Fermented dairy products</p>	<p>https://youtu.be/bKunpGA2r7U https://youtu.be/E4mdKIWndHA https://youtu.be/eIKuPGurtjU https://youtu.be/znhalRdr5Zs https://youtu.be/5MkssZ3zOWE https://www.labster.com/simulations/fermentation/ http://www.bch.cuhk.edu.hk/vlab2/animation/fermentation/index.html</p> <p>https://www.youtube.com/watch?v=q5bJDD1aYG4 https://www.youtube.com/watch?v=M_E7PnwqIKg&t=67s https://www.youtube.com/watch?v=MHfFFcdvKx0 https://www.youtube.com/watch?v=FIHv8SXvew4 https://youtu.be/XRuS1zcovtg https://www.youtube.com/watch?v=XRuS1zcovtg&t=60s https://www.youtube.com/watch?v=s2c_XBLFMjo</p> <p>https://www.maltosefalcons.com/tech/yeast-propagation-and-maintenance-principles-and-practices</p> <p>https://www.youtube.com/watch?v=7v0DGY-tQAE https://www.uwyo.edu/virtual_edge/lab26/yogurt_i</p>

		<p>5. Production of antibiotics</p> <p>6. Enzyme preparation</p> <p>7. Amino acid production</p> <p>8. Vitamin B12 production</p>	<p>ntro.html</p> <p>https://youtu.be/UTfLs8EJe20 https://youtu.be/3BVhJm6VShk https://youtu.be/H0ZZWXSH7OE https://youtu.be/FcDCDpC6wKE https://youtu.be/30hqY_RKgxA</p> <p>https://youtu.be/p6YJuiVB76M https://www.youtube.com/watch?v=dULCgkrviM8&t=8s https://www.youtube.com/watch?v=QBnaYrXOR1w</p> <p>https://www.youtube.com/watch?v=tkohlFr4JjA https://www.youtube.com/watch?v=tCL6Yt9KRyQ https://www.youtube.com/watch?v=gilL5Ly7QMk</p> <p>https://www.youtube.com/watch?v=8xEc4mHv8zo&t=3s https://www.youtube.com/watch?v=9Ub-kNInvUc&feature=youtu.be</p>
CS 685	Data Structure & Algorithm Lab	<p>1. Implementation of Array Operations: (using C/C++ languages)</p> <p>2. Stacks and Queues: Adding, Deleting elements, Circular Queue: Adding and Deleting elements, Merging Problem.</p> <p>3. Implementation of linked lists: Inserting, Deleting, Inverting a Linked List</p> <p>4. Sorting and Searching Algorithms</p>	<p>http://ds1-iiith.vlabs.ac.in/data-structures-1/exp/unordered-arrays/exp.html#Unsorted%20Arrays%20vs%20Binary%20Search</p> <p>http://ds1-iiith.vlabs.ac.in/data-structures-1/exp/sq/exp.html#Stacks%20and%20Queues</p> <p>http://ds1-iiith.vlabs.ac.in/data-structures-1/exp/linkedlists/exp.html#Linked%20List</p> <p>http://ds1-iiith.vlabs.ac.in/data-structures-1/exp/quicksort/exp.html#Quick%20Sort%20Experiment http://ds1-iiith.vlabs.ac.in/data-structures-1/exp/bubble-sort/exp.html#Bubble%20Sort%20Experiment http://ds1-iiith.vlabs.ac.in/data-structures-1/exp/mergesort/exp.html#Merge%20Sort http://ds1-iiith.vlabs.ac.in/data-structures-1/exp/heapsort/exp.html#Heapsort</p> <p>http://ds1-iiith.vlabs.ac.in/data-structures-1/exp/bfs/exp.html#Breadth%20First%20Search http://ds1-iiith.vlabs.ac.in/data-structures-1/exp/dfs/exp.html#Depth%20First%20Traversal</p>

		5. Prim's, Kruskal's And Dijkstra's Algorithm	http://ds2-iiith.vlabs.ac.in/data-structures-2/exp/mst/exp.html#Prim's%20Algorithm http://ds2-iiith.vlabs.ac.in/data-structures-2/exp/mst/exp.html#Kruskal's%20Algorithm http://ds2-iiith.vlabs.ac.in/data-structures-2/exp/dijkstras/exp.html#Dijkstra's%20Algorithm%20Experiment
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Virtual Lab Mapping for B. Tech in Food Technology – 8th Semester

Subject Code	Subject Name	List of Experiments	V-lab
FT 892	Product Development & Quality Assurance Lab	<ol style="list-style-type: none"> 1. Development of a food product prototype including product formulation and specifications 2. Selection and analysis of raw materials 3. Establishment of suitable process flow-diagram for the developed protocol 4. Development of HACCP plan for the processing line 5. Establishment of quality assurance protocol 6. Product testing (including sensory analyses) and shelf-life study 	<p>https://nzifst.org.nz/resources/foodproductdevelopment/documents/FoodProductDevelopment-Chapter7.pdf</p> <p>https://nzifst.org.nz/resources/foodproductdevelopment/documents/FoodProductDevelopment-Chapter3.pdf</p> <p>https://searchcio.techtarget.com/definition/product-development-or-new-product-development-NPD</p> <p>https://fssai.gov.in/cms/manuals-of-methods-of-analysis-for-various-food-products.php</p> <p>https://vimeo.com/332440257</p> <p>http://ouat.nic.in/sites/default/files/3-process_flow_chart_and_plant_layout_dairy_and_food_engineering.pdf</p> <p>https://www.fda.gov/food/hazard-analysis-critical-control-point-haccp/haccp-principles-application-guidelines#app-a</p> <p>https://vimeo.com/334422519</p> <p>http://www.iopp.org/files/public/FSAP/Final_4-3-12MultiwallBag_HACCPPlan.pdf</p> <p>https://fssai.gov.in/cms/manuals-of-methods-of-analysis-for-various-food-products.php</p> <p>https://vimeo.com/333254806</p> <p>http://ecoursesonline.iasri.res.in/mod/page/view.php?id=1029</p> <p>https://vimeo.com/336580469</p> <p>https://www.youtube.com/watch?v=bZBAKyVyBCE</p> <p>https://nptel.ac.in/courses/126/105/126105015/</p>

			<p>http://face-cii.in/sites/default/files/presentation/3dec/Aruna%20ram%20Kumar.pdf</p> <p>https://www.youtube.com/watch?v=UubCdTzfI54</p> <p>http://blpd.dss.go.th/micro/A%20Guide%20to%20Calculating%20the%20Shelf%20Life%20of%20Foods%20-%20New%20Zealand.pdf</p> <p>https://vimeo.com/342967196</p> <p>https://vimeo.com/342258127</p>
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