FACULTY OF SCIENCES

SYLLABUS

For

B.TECH. (FOOD TECHNOLOGY)
(Credit Based Evaluation & Grading System)
(Semester: I - VIII)

Examinations: 2019–20

GURU NANAK DEV UNIVERSITY
AMRITSAR.

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Defaulters will be prosecuted.

(ii) Subject to change in the syllabi at any time.
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FIRST SEMESTER

<table>
<thead>
<tr>
<th>Course No.</th>
<th>C/E/I</th>
<th>Course Title</th>
<th>Credits</th>
<th>Total Credits</th>
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<tr>
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<tr>
<td>FTL-102</td>
<td>C</td>
<td>Manufacturing Processes</td>
<td>3</td>
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<tr>
<td>FTL-103</td>
<td>C</td>
<td>Grain Handling and Storage Technology</td>
<td>2</td>
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<tr>
<td>FTL-104</td>
<td>C</td>
<td>Principles of Food Preservation</td>
<td>3</td>
<td>-</td>
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<tr>
<td>CYL-197</td>
<td>C</td>
<td>Engineering Chemistry</td>
<td>2</td>
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<tr>
<td>ENL-101</td>
<td>C</td>
<td>Communicative English-I</td>
<td>2</td>
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<tr>
<td></td>
<td>C</td>
<td>Punjabi Compulsory</td>
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<tr>
<td>PBL-121 /</td>
<td>*</td>
<td>**Punjab History &amp; Culture (Compulsory)</td>
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<td>PBL-122 /</td>
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<tr>
<td>HSL-101</td>
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<tr>
<td>SOA-101</td>
<td>C</td>
<td>***Drug Abuse: Problem, Management and Prevention (Compulsory ID Course)</td>
<td>3</td>
<td>-</td>
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<tr>
<td>FTP-121</td>
<td>C</td>
<td>Manufacturing Processes</td>
<td>-</td>
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<tr>
<td>FTP-122</td>
<td>C</td>
<td>Principles of Food Preservation</td>
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<tr>
<td>CYP-196</td>
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<td>Practical Chemistry</td>
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<tr>
<td>Total Credits:</td>
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<td>14</td>
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</table>

Note:
1. **Special Paper in lieu of Punjabi Compulsory.
2. **For those students who are not domicile of Punjab.
3. ***Student can opt this Paper whether in 1st or 2nd Semester.

Note 2: PSL-053 ID Course Human Rights & Constitutional Duties (Compulsory Paper). Students can opt. this paper in any semester except the 1st Semester. This ID Paper is one of the total ID Papers of this course.
## SECOND SEMESTER

<table>
<thead>
<tr>
<th>Course No.</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>FTL-152</td>
<td>C</td>
<td>Thermal Science</td>
<td>3</td>
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<tr>
<td>FTL-153</td>
<td>C</td>
<td>Food Chemistry</td>
<td>3</td>
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<tr>
<td>FTL-155</td>
<td>C</td>
<td>Applied Mathematics</td>
<td>3</td>
<td>4</td>
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<tr>
<td>ENL-151</td>
<td>C</td>
<td>Communicative English-II</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>PBL-131 / PBL-132 / HSL-102</td>
<td>C</td>
<td>Punjabi Compulsory OR  OR Punjabi History &amp; Culture (Compulsory)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>SOA-101</td>
<td>C</td>
<td>***Drug Abuse: Problem, Management and Prevention (Compulsory ID Course)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>FTP-172</td>
<td>C</td>
<td>Food Chemistry</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>FTP-173</td>
<td>C</td>
<td>Engineering Graphics and Drafting</td>
<td>-</td>
<td>3</td>
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<tr>
<td>ID-1</td>
<td>I</td>
<td>Interdisciplinary (ID) course</td>
<td>-</td>
<td>-</td>
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</tbody>
</table>

**Total Credits:** 13 2 5 20+ID

### Note:
2. **For those students who are not domicile of Punjab.
3. ***Credits will not be included in SGPA. Student can opt this Paper whether in 1st or 2nd Semester.
### THIRD SEMESTER

<table>
<thead>
<tr>
<th>Course No.</th>
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<tbody>
<tr>
<td>FTL-201</td>
<td>C</td>
<td>Basic Food Engineering</td>
<td>L: 3</td>
<td>T: 1</td>
</tr>
<tr>
<td>FTL-202</td>
<td>C</td>
<td>Basic Microbiology</td>
<td>L: 3</td>
<td>T: -</td>
</tr>
<tr>
<td>FTL-203</td>
<td>C</td>
<td>Food Hygiene and Sanitation</td>
<td>L: 3</td>
<td>T: -</td>
</tr>
<tr>
<td>FTL-206</td>
<td>C</td>
<td>Sugar Processing and Refining</td>
<td>L: 3</td>
<td>T: -</td>
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<tr>
<td>ESL-220</td>
<td>A</td>
<td>Environmental Studies (Compulsory ID Course)</td>
<td>L: 4</td>
<td>T: -</td>
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<tr>
<td>ECL-210</td>
<td>C</td>
<td>Basic Electrical and Electronics Engineering</td>
<td>L: 3</td>
<td>T: 1</td>
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<tr>
<td>FTP-221</td>
<td>C</td>
<td>Basic Microbiology</td>
<td>L: -</td>
<td>T: -</td>
</tr>
<tr>
<td>FTP-224</td>
<td>C</td>
<td>Sugar Processing and Refining</td>
<td>L: -</td>
<td>T: -</td>
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<tr>
<td>ID-2</td>
<td>I</td>
<td>Interdisciplinary (ID) course OR MOOC Course</td>
<td>L: -</td>
<td>T: -</td>
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**Total Credits:** 19 L, 2 T, 4 P, 25+ID

*Note: Credits will not be included in the Grand Credits*
## FOURTH SEMESTER

<table>
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<tr>
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<th>Course Title</th>
<th>Credits</th>
<th>Total Credits</th>
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</thead>
<tbody>
<tr>
<td>FTL-252</td>
<td>C</td>
<td>Cereals and Legumes Technology</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>FTL-253</td>
<td>C</td>
<td>Fruits and Vegetables Technology</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>FTL-254</td>
<td>E</td>
<td>Industrial Microbiology OR Sugar Industry Co-Products</td>
<td>3</td>
<td>3</td>
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<tr>
<td>OR</td>
<td></td>
<td>FTL-258</td>
<td></td>
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</tr>
<tr>
<td>FTL-255</td>
<td>C</td>
<td>Fluid Flow and Heat Transfer</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>FTL-256</td>
<td>C</td>
<td>Mechanical Operations Cereals and Legumes Technology (Lab)</td>
<td>3</td>
<td>4</td>
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<tr>
<td>FTP-271</td>
<td>C</td>
<td>Fruits and Vegetables Technology (Lab)</td>
<td></td>
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<tr>
<td>FTP-272</td>
<td>C</td>
<td>Fruits and Vegetables Technology (Lab)</td>
<td></td>
<td>2</td>
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<tr>
<td>FTP-273</td>
<td>E</td>
<td>Industrial Microbiology (Lab) OR Sugar Industry Co-Products (Lab)</td>
<td>-</td>
<td>2</td>
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<tr>
<td>OR</td>
<td></td>
<td>FTP-276</td>
<td></td>
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<tr>
<td>FTP-274</td>
<td>C I</td>
<td>Mechanical Operations (Lab) Interdisciplinary (ID) course OR MOOC Course</td>
<td>-</td>
<td>2</td>
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<tr>
<td>ID-3</td>
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**Total Credits:** 15, 4, 8, 27 + ID

**For elective courses:** The students can opt any one combination from the following:

- **Combination 1:** FTL-254 + FTP-273 (Industrial Microbiology)
- **OR**
- **Combination 2:** FTL-258 + FTP-276 (Sugar Industry Co-Products)
FIFTH SEMESTER

<table>
<thead>
<tr>
<th>Course No.</th>
<th>C/E/I</th>
<th>Course Title</th>
<th>L</th>
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<th>P</th>
<th>Credits</th>
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<tbody>
<tr>
<td>FTL-301</td>
<td>C</td>
<td>Dairy Technology</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>4</td>
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<tr>
<td>FTL-302</td>
<td>C</td>
<td>Fish, Meat and Poultry Technology</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>4</td>
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<tr>
<td>FTL-303</td>
<td>C</td>
<td>Fats and Oil Technology</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>3</td>
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<tr>
<td>FTL-306</td>
<td>C</td>
<td>Mass Transfer</td>
<td>3</td>
<td>-</td>
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<td>3</td>
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<tr>
<td>FTL-307</td>
<td>C</td>
<td>Computer Applications in Food Industry</td>
<td>3</td>
<td>1</td>
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<tr>
<td>FTP-321</td>
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<td>Dairy Technology (Lab)</td>
<td>-</td>
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<tr>
<td>FTP-322</td>
<td>C</td>
<td>Fish, Meat and Poultry Technology (Lab)</td>
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<tr>
<td>FTP-323</td>
<td>C</td>
<td>Fats and Oil Technology (Lab)</td>
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<tr>
<td>FTP-326</td>
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<td>Computer Applications in Food Industry (Lab)</td>
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<td>ID-4</td>
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<td>Interdisciplinary (ID) Course</td>
<td>-</td>
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<td>OR</td>
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<td>MOOC Course</td>
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## SIXTH SEMESTER

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<tr>
<td>FTL-351</td>
<td>C</td>
<td>Food Regulations and Quality Control</td>
<td>3 1</td>
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<tr>
<td>FTL-352</td>
<td>C</td>
<td>Applications of Enzymes in Food Industry</td>
<td>3 -</td>
<td>3</td>
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<tr>
<td>FTL-353</td>
<td>C</td>
<td>Biochemical Engineering</td>
<td>2 -</td>
<td>2</td>
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<tr>
<td>FTL-354</td>
<td>C</td>
<td>Packaging Technology</td>
<td>3 1</td>
<td>4</td>
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<tr>
<td>FTL-357</td>
<td>C</td>
<td>Human Resources Management in Food Industry</td>
<td>3 -</td>
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<tr>
<td>FTL-358</td>
<td>C</td>
<td>Sugar Industry (Technical Control and Design)</td>
<td>3 1</td>
<td>4</td>
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<td>FTP-371</td>
<td>C</td>
<td>Food Regulations and Quality Control</td>
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<td>FTP-372</td>
<td>C</td>
<td>Biochemical Engineering</td>
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<td>FTP-373</td>
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<td>Packaging Technology</td>
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<td>FTP-374</td>
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<td>Sugar Industry Design Lab</td>
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<td>FTL-401</td>
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<td>Food Process Engineering</td>
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<td>FTL-402</td>
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<td>Confectionery Technology</td>
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<td>FTL-403</td>
<td>C</td>
<td>Spices and Flavour Technology</td>
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<td>FTL-404</td>
<td>C</td>
<td>Food Processing Plant Layout and Design</td>
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<td>FTP-421</td>
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<td>Food Process Engineering (Lab)</td>
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<td>FTP-422</td>
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<td>Confectionery Technology (Lab)</td>
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<td>FTP-423</td>
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<td>Spices and Flavour Technology (Lab)</td>
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<td>Seminar and Group Discussion</td>
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**Total Credits:**

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## EIGHTH SEMESTER

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<tr>
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<td>A</td>
<td>Industrial Training</td>
<td>-</td>
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<td>(4 months i.e. Jan-April)</td>
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<tr>
<td>FTP-452</td>
<td>A</td>
<td>Research Project</td>
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<tr>
<td></td>
<td>20</td>
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Last date for Submission of:

i) Training report within two weeks after coming from training.

ii) Research Project to be submitted by 15th June.

iii) Defence of the Project Report: 30th June.
B.TECH. (FOOD TECHNOLOGY) SEMESTER-I  
(Credit Based Evaluation & Grading System)

FTL-102: MANUFACTURING PROCESSES  
Credits: 3-1-0

Time: 3 Hours  
Max. Marks: 100  
Mid Semester Marks : 20  
End Semester Marks : 80  
Mid Semester Examination: 20% weightage  
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Note: Students can use the Non-Programmable scientific calculator.

SECTION-A

Ferrous Metal and Alloys: Introduction, Pig iron, cast iron, wrought iron, carbon steel, alloy steel, blast furnace, modern development, electric furnace process, classification of steel, unalloyed steels and alloy steels.


SECTION-B
Carpentry: Introduction, structure of wood, grain in wood, seasoning of wood, classification of wood, common varieties of Indian timber, carpentry tools marking and measuring tools, cutting tools, boring tools, striking tools, holding tools, miscellaneous tools, carpentry processes marking, sawing, planning, chiseling, boring, grooving, rebating, moulding, carpentry joints, wood working lathe, circular saw, band saw, wood planer, joint, mortiser.

SECTION-C
Foundry: Introduction, pattern making pattern materials, types of pattern, solid pattern, split pattern, match plate pattern, three piece split pattern, etc. Pattern making allowances moulding tools and equipments. Moulding sand, types of moulding sands, properties of moulding sand casting defects.

Mechanical Working of Metals (Metal Forming) : Introduction, hot working, rolling, forgoing, piercing, Drawing, Spinning, extruding, cold working, metallurgical advantages of hot working over cold working processes.

SECTION-D

Drilling Machine: Introduction, types of drilling machine, work holding devices, list of drilling machine operation, twist drill nomenclature.

Shaper and Planning Machines: Introduction, types of shaper and planner, list of shaper and planer operations, Planner vs shaper machine.

Grinding Machines : Introduction, kinds of grinding, types of grinding machines, rough grinding and precision grinding, potable and flexible shaft grinders, swing frame grinders, surface grinders etc. size and capacities of the grinder.

Recommended Books:
2. Workshop Technology by W.A.J. Chapman, Part I and
B.TECH. (FOOD TECHNOLOGY) SEMESTER-I
(Credit Based Evaluation & Grading System)

FTL-103: GRAIN HANDLING AND STORAGE TECHNOLOGY
Credits: 2-0-0

Time: 3 Hours

Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Note : Students can use the Non-Programmable scientific calculator.

SECTION-A
Principles of grain storage
Grain storage structures

Stored product pests- insects, rodents, fungi, their nature and occurrence

SECTION-B
Pest control- Techniques of pesticides application and fumigations
Pesticide chemistry, their toxicology and residual analysis
Pest control measures and sanitation of mills

SECTION-C
Grain procurement and handling
Modern techniques of infestation control

SECTION-D
Pesticides and health hazards
MAS / CAS, Hypobaric storage
Recommended Books:

1. Pesticides and Pollution by Mollan
2. Systematic Fungicide by Marsh (1973)
4. Pesticides Formulations by Woods.
B.TECH. (FOOD TECHNOLOGY) SEMESTER-I
(Credit Based Evaluation & Grading System)

FTL-104: PRINCIPLES OF FOOD PRESERVATION
Credits: 3-0-0

Time: 3 Hours                                                                                                     Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Note: Students can use the Non-Programmable scientific calculator.

SECTION-A
General introduction of food preservation
Historical development in food preservation
Characteristics of foods
Causes of quality deterioration of foods and methods of its prevention
Preparation of food for processing
Canning

SECTION-B
Drying /dehydration, types of dryers
Irradiations, sources and mechanism and Microwave heating (Principle and working)
Additives and chemical preservative

SECTION-C
Enzymes in Food processing
Freezing and cold storage of foods, factors effecting freezing types of freezing and freezers
Food Processing and malnutrition, restoration, enrichment, fortification and supplementation of foods

SECTION-D
Pickling and fermented products
Intermediate moisture foods
Food packaging – rigid and flexible, corrosion of container
Recommended Books:

1. Food Science – Potter.
2. Technology of Food Preservation – Dessrosier and Dessrosier
B.TECH. (FOOD TECHNOLOGY) SEMESTER-I
(Credit Based Evaluation & Grading System)

CYL–197 ENGINEERING CHEMISTRY Credits: 2-1-1

Time: 3 Hours

Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Students can use the Non-Programmable scientific calculator.

Section – A

Water Hardness: Common Impurities of water, methods of determination of hardness, clark's test and complex metric (EDTA) method, Degree of hardness. Numerical based on hardness and EDTA method.

Water Hardness Related problems: Boiler troubles their causes, disadvantages and prevention: Formation of solids (Scale and Sludge), Carry over (Priming and Foaming), Corrosion and Caustic (Scale and Sludge) Embrittlement.

Water Treatment Techniques: Introduction about water purification techniques, steps involved in purification of water, Sedimentation, coagulation, Filtration and Sterilization, Chlorination Water Treatment.


Section – B

Glass: Definition, Properties, Manufacturing of glass, Types of silicate glasses and their commercial uses, Importance of annealing in glass making

Refractories: Definition, classification, properties, Requisites of good refractory and manufacturing of refractory, detailed study of silica and fire clay refractory and their uses. Seger's (Pyrometric) Cone Test and RUL Test

Section – C

Polymers: Introduction about polymers, different types of polymers, Different methods of classification and constituents of polymers, Thermosets and Thermoplastics, Preparation, Properties and uses of polyethylene, PP, Bakelite, polyester and Nylon


Silicone Based Compounds: Introduction, Preparation of silicones, cross linked silicones, Silicon fluids or oils, Silicon elastomers, Silicon resins and their applications.
Section – D

Electrochemistry: Faraday’s Laws, conductance, Arhenium theory of ionization, molar conductance, transport numbers, electric potential difference for a galvanic cell, types of half cells, standard electrode potential, concentration cells.

Metal Ions in Biological Systems: Introduction, energy sources for life, non-photosynthetic processes Essential and trace elements on biological processes, Biological role of alkali and alkaline earth metal ions with special reference of Na⁺-K⁺ Pump.

References:
3. Concise Inorganic Chemistry by J. D. Lee, Fifth Edition

List of Practicals:
1. Find the strength of KMnO₄ solution.
2. Determine number of water molecules in Mohr salt by titration method.
3. Determine percentage of sodium carbonate in given sample of washing soda.
4. Determine percentage of sodium carbonate and sodium hydroxide in given sample of caustic soda.
5. Determine percentage of acetic acid in given sample of vinegar.
6. Determination of total Hardness of Water.
7. Determine the permanent and temporary hardness in the given sample of water.
8. Determination of coefficient of viscosity of a given liquid by viscometer.
9. To determine the unknown composition of a given mixture of two liquids by viscosity method.
10. Determination of Chlorine in bleaching powder.
11. To determine the strength of HCL by conductometrically.
12. To determine the strength of strong and weak acid conductometrically.
13. To determine the distribution coefficient of iodine between Cyclohexane and water
14. Determination of surface tension of a given liquid by drop number method by stalagmometer.
15. To Determine The Critical Micelle Concentration of A Soap (Sodium Laurate) by surface tension measurements.

References:
1. Findlay’s Practical Physical Chemistry.
3. Quantitative Organic Analysis by Vogel
B.TECH. (FOOD TECHNOLOGY) SEMESTER-I
(Credit Based Evaluation & Grading System)

ENL-101 : COMMUNICATIVE ENGLISH–I

Credits: 02 (L= 2, T=0, U=0)

Time: 3 Hours

Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Objective: To introduce students to the skills and strategies of reading and writing by identifying organizational patterns, spotting classification systems and understanding associations between ideas. This course will prepare students to read a variety of texts and also to communicate more effectively through writing. The course will also pay special attention to vocabulary building.

Prescribed Text books:

Section–A

Section–B

Section–C

Section–D
B.TECH. (FOOD TECHNOLOGY) SEMESTER-I
(Credit Based Evaluation & Grading System)

PBL 121: धानिक खाद्य - I

Credit: 2-0-0
Max. Marks: 100
Mid Semester Marks: 20
End Semester Marks: 80
Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Time: 3 Hours

Max. Marks: 100

Mid Semester Marks: 20
End Semester Marks: 80
Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

1. पृष्ठ क्षेत्र की तमन्ना हमें ले जाएँ। उस जगा दिखाएँ जो पृष्ठ क्षेत्र सभी हो।
2. यदि भुजित तथा किसी भी खाद्य संपादन हो। धानिक खाद्य किसी भी ही जगा किसी बारत ना मिलेंगा तो।
3. रात में पृष्ठ के तकनीक अंग का।
4. धानिक मैट लगता दस्ते प्रतिव उभय उस पृष्ठ की देख अंगे दें दें दें दें रंग पृष्ठ-पृष्ठ हिंस सब मिलेंगे तो।

मेला-मेरी

1. लें गैंड (सौर, उद्योगिता मिस्त्र दिउ, धूँध मिस्त्र संयोगी)
उस पल है जिसे गूढ़ी haunt, सौंदर्य मिस्त्र दिउ का सतह की तरह:
(त) फूटी दोहरी मिस्त्र
(अ) पहली दम पाँचवाँ
(त) म. खून मिस्त्र
(बच्चे सा सीखत, थिरिया-साल, गूढ़ मिस्त्र, लॉट-ज्याम)

II. धानिक खाद्यवागी ती संवाद (पेड़ी, भूसादी, सीखी, दिनी भो भाग); हिंसन फून्ड, मधुर सेंद (उप-आप)

मेला-मेरी

1. लें गैंड (सौर, उद्योगिता मिस्त्र दिउ, धूँध मिस्त्र संयोगी)
उस पल है जिसे गूढ़ी haunt, सौंदर्य मिस्त्र दिउ का सतह की तरह:
(त) हिंसन फून्ड मिस्त्र
(अ) म. खून मिस्त्र
(ब) उद्योगिता मिस्त्र
(बच्चे सा सीखत, थिरिया-साल, गूढ़ मिस्त्र, लॉट-ज्याम)

II. धानिक खाद्यवागी ती संवाद (पेड़ी-पुल, संवाद भो घर बड़ी दितों दुई) : 10 देख हिंसन फून्डेलिते (उप-आप भो धान रत्न अक्षम)

मेला-मेरी

1. लें गैंड (सौर, उद्योगिता मिस्त्र दिउ, धूँध मिस्त्र संयोगी)
उस पल है जिसे गूढ़ी haunt, सौंदर्य मिस्त्र दिउ का सतह की तरह:
(त) हिंसन फून्ड मिस्त्र
(अ) भूसादी धूँध
(ब) उद्योगिता मिस्त्र
(बच्चे सा सीखत, थिरिया-साल, गूढ़ मिस्त्र, लॉट-ज्याम)

II. मौसूम, भोजन : हिंसन फून्ड मिस्त्र भोजन मजबूर है मौसूम बड़ी
(15 देख हिंसन दें भोजन अक्षम बड़ी हिंसन फून्डे)

मेला-मेरी

1. लें गैंड (सौर, उद्योगिता मिस्त्र दिउ, धूँध मिस्त्र संयोगी)
उस पल है जिसे गूढ़ी haunt, सौंदर्य मिस्त्र दिउ का सतह की तरह:
(त) हिंसन फून्ड मिस्त्र संथा
(अ) भूसादी धूँध
(बच्चे सा सीखत, थिरिया-साल, गूढ़ मिस्त्र, लॉट-ज्याम)

II. अश्विनी हिंसन फून्ड : हिंसन, टढ़की दें संवाद राजसिः रत्न मेलामेन
B.TECH. (FOOD TECHNOLOGY) SEMESTER-I
(Credit Based Evaluation & Grading System)

PBL-122: भूखांतरी भूखांतरी
(In lieu of Punjabi Compulsory)

Credits: 2-0-0
Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80
Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Time: 3 Hours

1. पूरा पंडुल के खिलाफ दान द्वारा चलाया जा रहा है। उन जगह विचार दे पूरा पंडुल बढ़ाने।
2. विषयभूमि के खिलाफ पूरा पूरा बढ़ाने चलता है। उन जगह विचार दिख दिखाने समय भी है।
3. उन्नत पूरा भेज दें घटता भाग उठा।
4. दृष्टि मैं बड़ा है शरीर बाधा ऊपर अंतराल है। इंटर पूरा बढ़ाने दिख दिखाने बड़ा महत्व ये।

वाण-खूब

मैवमल-दै

पैंडी अभजति, अभिषक बुध, भावाँल (अच्छी मान-यहाँ)
लकागम (डिंडी, डिंडी, भागम) : पंडुल दे दवउ

मैवमल-दी

अधिशासी मध्ये पंडुल दवउः भृंगी मान-यहाँ
यवान सम्बंधे, मानमल मध्ये, क्षमन्त मध्ये
भूल मध्ये, अलेउआ अरे प्रणयन

मैवमल-भी

मूंप अमूंय : विचार दें दें विचार अमूंय मध्ये हृंद बढ़ता।
महात्मावर दे विचारपावर मध्ये

मैवमल-बी

उदाहरण के मांड दिलं दे दूं, अरुण भीणिक्किंच दे दूं, उदाहरण के तभ, दिख दे में उंदर दीडिय मध्यसंग दिख।
B.TECH. (FOOD TECHNOLOGY) SEMESTER-I
(Credit Based Evaluation & Grading System)

HSL-101 : Punjab History & Culture (1450-1716)
(Special paper in lieu of Punjabi Compulsory)
(For those students who are not domicile of Punjab)

Credits: 2-0-0
Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Time: 3 Hours
Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section-A
1. Land and the People.
2. Bhakti Movement

Section-B
3. Life and Teaching of Guru Nanak Dev.

Section-C
5. Guru Hargobind.
6. Martyrdom of Guru Teg Bahadur

Section-D

Suggested Reading
B.TECH. (FOOD TECHNOLOGY) SEMESTER-I  
(Credit Based Evaluation & Grading System)

SOA-101 : DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION  
(COMPULSORY ID COURSE)  
(Student can opt. this paper whether in 1st or 2nd semester)

PROBLEM OF DRUG ABUSE

Credit 3-0-0

Time: 3 Hours

Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section – A
Meaning of Drug Abuse:
2) Consequences of Drug Abuse for:
   Individual : Education, Employment, Income.
   Family : Violence.
   Society : Crime.
   Nation : Law and Order problem.

Section – B
Management of Drug Abuse:
(i) Medical Management: Medication for treatment and to reduce withdrawal effects.
(ii) Psychiatric Management: Counselling, Behavioural and Cognitive therapy.
(iii) Social Management: Family, Group therapy and Environmental Intervention.

Section – C
Prevention of Drug abuse:
(i) Role of family: Parent child relationship, Family support, Supervision, Shaping values, Active Scrutiny.
(ii) School: Counselling, Teacher as role-model. Parent-teacher-Health Professional Coordination, Random testing on students.
Controlling Drug Abuse:
(i) Media: Restraint on advertisements of drugs, advertisements on bad effects of drugs, Publicity and media, Campaigns against drug abuse, Educational and awareness program

References:

FTP-121: MANUFACTURING PROCESSES

Credits: 0-0-2

Note: Students can use the Non-Programmable scientific calculator.

1. Machine Shop

Machine shop practice on Lathe, Milling machine and sharper simple jobs.

2. Carpentry Shop

Simple, jobs on sawing, ripping, planning and chiselling, wood turning, practice in carpentry shop.

3. Foundry Shop

Sand mixing and meld making of simple jobs practice in foundry shop.

4. Fitting Shop

Simple jobs on fitting, sawing, tapping and dieing practice in fitting shop.

5. Sheet Metal Shop

Cutting and joining of sheet metal jobs, simple cylindrical jobs, Practice in sheet metal shop.

6. Smithy Shop

Simple jobs practice in smithy shop.

7. Welding Shop

Fillet joint welding and corner joint welding – practice in welding shop.

8. Electrical shop

Single switch wiring for household and winding of coils practice in electrical shop.
FTP-122: PRINCIPLES OF FOOD PRESERVATION

Credits: 0-0-2

Note: Students can use the Non-Programmable scientific calculator.

1. Demonstration of different machinery used in food processing.
2. Canning operations.
3. Cut out analysis of canned product.
4. Preparation and analysis of syrups and brines.
5. Blanching of fruits and vegetables.
6. Chemical preservation of processed foods.
7. Evaluation of ingredients used in food processing.
8. Dehydration of food.
10. Mold inhibitor in bakery products.
11. Fermented products: dairy, cereals, fruits and vegetables, meat.
12. Freezing of foods.
1. Find the strength of KMnO4 solution.
2. Determine number of water molecules in Mohr salt by titration method.
3. Determine percentage of sodium carbonate in given sample of washing soda.
4. Determine percentage of sodium carbonate and sodium hydroxide in given sample of caustic soda.
5. Determination of total Hardness of Water.
6. Determine the percentage of Ca\(^{2+}\) and Mg\(^{2+}\) in the given sample of water.
7. To determine the molecular weight of a compound by Rast’s micro method.
8. Determination of coefficient of viscosity of a given liquid by viscometer.
9. To determine the unknown composition of a given mixture of two liquids by viscosity method.
10. To find the mol. wt. of high polymer by using viscosity measurements.
11. Determination of surface tension of a given liquid by drop number method by stalagmometer.
12. To determine the critical micelle concentration of a soap (sodium laurate) by surface tension measurements.
13. To determine the distribution coefficient of I2 between CCl4 and water.
14. To determine refractive index of a liquid by Abbe’s refractometer and hence the specific and molar refraction.
15. Determination of Chlorine in bleaching powder.

**Recommended Books:**

1. Findlay’s Practical Physical Chemistry.
3. Quantitative Organic Analysis by Vogel.
B.TECH. (FOOD TECHNOLOGY) SEMESTER-II  
(Credit Based Evaluation & Grading System) 

FTL-152: THERMAL SCIENCE 
Credits: 3-1-0 
Time: 3 Hours 
Max. Marks: 100 
Mid Semester Marks : 20 
End Semester Marks : 80 

Mid Semester Examination: 20% weightage 
End Semester Examination: 80% weightage 

Instructions for the Paper Settters: 
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section. 

Note: Students can use the Non-Programmable scientific calculator. 

SECTION-A 

SECTION-B 
First Law of Thermodynamics: Introduction to first law of thermodynamics, heat transfer, work. Internal energy, enthalpy and specific heat of ideal gases, solids and liquids. First law analysis of steady flow, applications of steady flow energy equation to engineering devices. Thermodynamic aspects of biological systems. 

SECTION-C 
Second Law of Thermodynamics: Limitations of first law. Kelvin Plank and Clausius statements of second law and their equivalence; their applications to a refrigerator, heat pump and heat engines. Reversible and irreversible processes, conditions for reversibility. 

SECTION-D 
Gas Power Cycles: Piston cylinder arrangement, philosophy of Otto and Diesel combustion cycle; their compression ratio, mean effective pressure, power output and efficiency; comparison between the two cycles. 

Internal Combustion Engines: Classification and application, constructional and working details of two stroke and four stroke cycle engines.
Recommended Books:

3. Heat Engineering by VP Vasandani and BS Kumar; Metropolitan Book Company Pvt. Ltd., 1, NetajiSubhashMarg, New Delhi.
4. Thermodynamics by JP Helman; McGraw Hill.
5. Engineering Thermodynamics by DB Spalding and DH Cole; ELBS and Edward Arnold Pub. Ltd., (Low Priced Ed.).
B.TECH. (FOOD TECHNOLOGY) SEMESTER-II
(Credit Based Evaluation & Grading System)

FTL-153: FOOD CHEMISTRY

Credits: 3-0-0
Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Note : Students can use the Non-Programmable scientific calculator.

SECTION-A


SECTION-B


SECTION-C

Lipids: Classification of lipids, fatty acid, soap and detergent, essential fatty acids, fats and oils saponification number acid numbers iodine value, acetyl value, Reichart – Meissl number, Oxidative and hydrolytic rancidity, reversion, waxes phosphoglycerides, sphignolipids, non – saponifiable lipids, cholesterol, prostaglandins, lipis billayers, monolayers and micelles, structure of cell membrane.

SECTION-D

Natural Pigments and Flavouring Agents: Chlorophyll, carotonoids, anthocyannics, anthoxanthins, flavonoids, tannins. Natural flavour constituents.

Recommended Books:

1. Food Chemistry – Meyar.
2. Food Chemistry – Fenamma.
FTL-155: Applied Mathematics

Time: 3 Hours

Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Note: Students can use the Non-Programmable scientific calculator.

SECTION-A

Differential Calculus: Partial derivatives, Euler’s theorem for homogeneous functions, total derivative, change of variables, Lagrange’s methods of undetermined multipliers.

SECTION-B

Exact differential equations, integrating factors, Linear differential equations, Cauchy’s form, Legendre linear equations, simultaneous linear equations with constant coefficients, Total differential equations.

SECTION-C

Statistical Methods: A general introduction about the role of statistics in science and technology, Classification and tabulation of frequency distribution, Diagrametic and graphical representation of frequency distribution data, Measures of central tendency, dispersion, skewness and kurtosis. Correlation and regression analysis for bivariate data, partial and multiple correlations (for three variables only).

SECTION-D

Probability and Statistical Inference: An introduction to probability and random variables, Binomial, Poisson and Normal probability distributions, their definitions and important applications in the industry. Random sample, Tests of hypothesis and level of significance. Chi-square, t and Z tests: their applications in industry.

Recommended Books
B.TECH. (FOOD TECHNOLOGY) SEMESTER-II
(Credit Based Evaluation & Grading System)

ENL-151: COMMUNICATIVE ENGLISH–II

Credits: 02 (L= 2, T=0, U=0)
Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Time: 3 Hours

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Objective: To introduce students to the skills and strategies of reading and writing by identifying organizational patterns, spotting classification systems and understanding associations between ideas. This course will prepare students to read a variety of texts and also to communicate more effectively through writing. The course will also pay special attention to vocabulary building.

Prescribed Text books:

SECTION–A
Practical question on Note Making, Summarizing and Abstracting as given in The Written Word by Vandana R. Singh

SECTION–B
Practical question on Paragraph writing as prescribed in The Written Word by Vandana R. Singh

SECTION–C
Theoretical questions based on ABC of Good Notes as prescribed in The Written Word by Vandana R. Singh.


SECTION–D
Practical question on Essay writing from The Written Word by Vandana R. Singh
B.TECH. (FOOD TECHNOLOGY) SEMESTER-II
(Credit Based Evaluation & Grading System)

PBL 131 : धनाश्री भानवी - II

Time: 3 Hours

Credit : 2-0-0
Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

अंक-दीर्घ अनुसार पक्षीभव झलक उत्पादन

1. पुष्प पदक दे चुन जुगा लें। उस जुगा दिए हुए पुष्प पदक लें।
2. हिंदिभाषी हे बुंदे धा पुष्प बचते गए। उस जुगा हिसेब पुष्प जुगवाना है। पैसोंने पुष्प लिए ही जुगा हिसेब बीज 20 ना मंदबूख है।
3. उत्तर घर दे विद्वान पक्षी उत्पादन
4. पेशे मैंंट बचत देकर मेहम दे उस पुष्प दी दीख भूते हृंद 2 हृंद चुन धूप-पुष्पां दिख नव मामला।

मैत्रम-बी

I. दे ठेका (भूप, जगमगन सिंग दिल्ली, भूप मिश्र महामही)
तन तरफ रोटे त्रांतिकामी, भूपरस्त हिपे रोटे दिखे बाजारीवाला
(ए) पूर्वया मिश्र हिपे रोटे
(भ) हृंदभाषी मिश्र महामही : हृंदभाषी हृंदभाषी
(ब) तांत्रिक मिश्र नेता : पैदी दे दिखाए (बाजारीवाला दे नीला, बाजारी मान, दिमा-समुद्र, बाजारी वला)

II. धनाश्री मूल घटना : पदु-अनुष्ठ, चोल्ला (भोजपुर, दिल्ली, दिल्ली अथवे दिल्ली), महमान

मैत्रम-बी

I. दे ठेका (भूप, जगमगन सिंग दिल्ली, भूप मिश्र महामही)
तन तरफ रोटे त्रांतिकामी, भूपरस्त हिपे रोटे दिखे बाजारीवाला
(ए) मुमता मिश्र : बूढ़ी देवी
(भ) दूल्हन मिश्र दिखवा : बूढ़ी देवी देवी
(ब) तांत्रिक मिश्र नेता : हृंदभाषी हृंदभाषी
(ब) पैदी मिश्र : हृंदभाषी हृंदभाषी (बाजारीवाला दे नीला, बाजारी मान, दिमा-समुद्र, बाजारी वला)

II. मुखसंद दे अनुक्रम (अनुक्रम दे मुखसंद चेहरा दिख) 200 भूपरस्त हिपे 100 अनुक्रम दे राजमूर दिख (बाजारीवाला दे जुगा जुगा)
B.TECH. (FOOD TECHNOLOGY) SEMESTER-II
(Credit Based Evaluation & Grading System)

PBL-132: ਪ੍ਰੱਖਣਪੀ
(In lieu of Punjabi Compulsory)

Credits: 2-0-0
Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Time: 3 Hours

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

1. ਪ੍ਰਸਤਲ ਪੰਛੀ ਦੇ ਸੁਨ ਕਨਾ ਟੇਲੀ। ਉਹ ਕਨਾ ਹਿਸਤਾਂ ਦੇ ਪ੍ਰਸਤਲ ਪੰਛੀ ਸਟਾਲਣ।
2. ਪ੍ਰਸਤਲ ਦੈਰੀਆਂ ਤੇ ਬੁੱਝ ਪ੍ਰਸਤਲ ਬਚਨੀ ਰਹੀ ਹੈ। ਉਹ ਕਨਾ ਹਿਸਤਾਂ ਦੇ ਪ੍ਰਸਤਲ ਸਟਾਲਣ।
3. ਕਨਾ ਪ੍ਰਸਤਲ ਦੇ ਸਟਾਲਣ ਭਰੇ ਗਏ।
4. ਦੇਖਾ ਮੌਲ ਬਚਨ ਸਟਾਲ ਸੁਕਾ ਕਏ ਉਤੇ ਪ੍ਰਸਤਲ ਦੇ ਸਟਾਲ ਪੰਛੀ ਟੇਲੇ ਕੇ ਟੇਲੇ ਸੁੱਣ ਦੀ ਪ੍ਰਸਤਲ ਦੀ ਹਿਸਤਾਂ ਵਾਲੇ ਸੁਕਾ ਗਏ।

ਪ੍ਰਾਪਤ-ਪ੍ਰਣਾਲੀ

ਨੈਵੋਂ-ਦੇ

ਖਾਸ਼ਤੇ ਤੇ ਨਾਤੇ, ਖੇਤੀ ਅਤੇ ਹੋਰ ਧਰਤੀਆਂ ਨਾਲ ਸਬ ਧਰਤੀਆਂ।

ਪ੍ਰਾਪਤ-ਪ੍ਰਣਾਲੀ

ਰੂਪ ਦਰਮਿਆਨ: ਪ੍ਰਸਤਲ ਅਤੇ ਦਰਮਿਆਨ
(ਰੂਪ, ਪ੍ਰਸਤਲ ਅਤੇ ਦਰਮਿਆਨ)

ਪ੍ਰਾਪਤ-ਪ੍ਰਣਾਲੀ

ਰੂਪ ਦਰਮਿਆਨ ਲਾ ਖਾਸ਼ਤੀ ਪ੍ਰਸਤਲਾਂ: ਖਾਸ਼ਤੀ, ਦਰਮਿਆਨ, ਦਰਮਿਆਨ-ਦਰਮਿਆਨ, ਪ੍ਰਸਤਲ ਅਤੇ ਦਰਮਿਆਨ ਭਾਗ ਸਰੂਪਵੀਚਾਰ।

ਪ੍ਰਾਪਤ-ਪ੍ਰਣਾਲੀ

ਪ੍ਰਸਤਲ ਵਾਹਨ-ਵਾਹਨ

ਮੰਗਵਾਦਰਾਨੀ (ਪ੍ਰਸਤਲ ਅਤੇ ਦਰਮਿਆਨ)
ਸੰਗਰਵਾਦਰਾਨੀ (ਪ੍ਰਸਤਲ ਅਤੇ ਦਰਮਿਆਨ)
ਭਿੰਨਵਾਦਰਾਨੀ (ਪ੍ਰਸਤਲ ਅਤੇ ਦਰਮਿਆਨ)

ਪ੍ਰਾਪਤ-ਪ੍ਰਣਾਲੀ

ਪ੍ਰਸਤਲ ਵਾਹਨ

ਸਪੇਸਲ ਵਾਹਨ
B.TECH. (FOOD TECHNOLOGY) SEMESTER-II
(Credit Based Evaluation & Grading System)

HSL-102 : Punjab History & Culture (1717-1947)
(Special paper in lieu of Punjabi Compulsory)
(For those students who are not domicile of Punjab)

Credits: 2-0-0
Time: 3 Hours
Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four
Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are
required to attempt five questions, selecting at least one question from each Section. The fifth
question may be attempted from any Section.

Section-A
1. Sikh Struggle for Sovereignty.
2. Ranjit Singh : Conquests, Administration and the Anglo-Sikh Relations.

Section-B
3. Anglo-Sikh Wars and the Annexation.

Section-C
5. Economic Changes: Agricultural

Section-D
8. Fairs and Festivals.

Suggested Reading
1. Kirpal Singh (ed.), History and Culture of the Punjab, Part-II, Punjabi University,
SOA-101 : DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION
(COMPULSORY ID COURSE)
(Student can opt. this paper whether in 1st or 2nd semester)

PROBLEM OF DRUG ABUSE

Credit 3-0-0

Time: 3 Hours
Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section – A
Meaning of Drug Abuse:
4) Consequences of Drug Abuse for:
   Individual : Education, Employment, Income.
   Family : Violence.
   Society : Crime.
   Nation : Law and Order problem.

Section – B
Management of Drug Abuse:
(iv) Medical Management: Medication for treatment and to reduce withdrawal effects.
(v) Psychiatric Management: Counselling, Behavioural and Cognitive therapy.
(vi) Social Management: Family, Group therapy and Environmental Intervention.

Section – C
Prevention of Drug abuse:
(iii) Role of family: Parent child relationship, Family support, Supervision, Shaping values, Active Scrutiny.
(iv) School: Counselling, Teacher as role-model. Parent-teacher-Health Professional Coordination, Random testing on students.
Controlling Drug Abuse:

(iii) Media: Restraint on advertisements of drugs, advertisements on bad effects of drugs, Publicity and media, Campaigns against drug abuse, Educational and awareness program


References:

FTP-172: FOOD CHEMISTRY

Credits: 0-0-2
Max. Marks: 100

Note: Students can use the Non-Programmable scientific calculator.

1. Preparation of sample for analysis.
2. Determination of acidity/ pH in food.
3. Preparation of standard solutions.
5. Crude fiber, reducing and non – reducing sugar.
6. Estimation of minerals such Ca, Mg, K, Fe, Cu, etc.
7. Estimation of ascorbic acid.
FTP-173: ENGINEERING GRAPHICS AND DRAFTING

Credits: 0-0-3
Max. Marks : 100

Note: Students can use the Non-Programmable scientific calculator.

Drawing Practice based on problems on topic covered in Engineering Graphics.
FTL–201: BASIC FOOD ENGINEERING

Credits: 3-1-0

Time: 3 Hours
Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Note : Students can use the Non-Programmable scientific calculator

Section -A
1. Dimensions and engineering units: Definition of terms, base, derived and supplementary units, different systems of measurement, dimensional equations, conversion of units using dimensional equations.

2. Properties of fluids and solids: State of a system, definition of extensive and intensive properties, density, concentration, moisture content, pressure, temperature, viscosity, enthalpy, equation of state and perfect gas law, phase diagram of water.

Section -B

Section -C

Section -D
5. Preservation processes: Microbial survivor curves, thermal death time, spoilage probability, general method for process calculations: applications to pasteurization, sterilization, aseptic processing and packaging.
Recommended Books:

FTL–202: BASIC MICROBIOLOGY

Time: 3 Hours

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Note: Students can use the Non-Programmable scientific calculator

Section-A

Microbiology and its scope.
Microscopy, classification.
Pure cultures and their characteristics.
Maintenance of cultures, culture techniques, enumeration techniques.

Section-B

Morphology and physiology of bacteria, yeast, molds and algae growth.
Nutrition and reproduction, isolation and identification of micro organisms.
Microbial ecology.
Microbial interactions.

Section-C

Physical and chemical methods of control of micro organisms.
Virus, common pathogenic organisms, immune response.
Antigen - antibody interaction and antibodies.

Section-D

Incidences of micro-organisms in soil, water, air, food and sewage.
Food spoilage organisms.
Food borne infections and poisoNing organisms, sanitation and Hygiene.

Recommended Books:
2. Microbiology - Palczer, Chan and Creig.
FTL–203: FOOD HYGIENE AND SANITATION

Time: 3 Hours

Credits: 3-0-0
Max. Marks: 100
Mid Semester Marks: 20
End Semester Marks: 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Note: Students can use the Non-Programmable scientific calculator

Section-A

General principles of food hygiene. Personal hygiene. Food handling habits, water sources and impurities in water supply and treatment. Sanitation facilities and procedures in food plant operation.

Section-B

Good Manufacturing Practices. Good Laboratories Practices. Quality Circles and Quality Culture Concept

Section-C

Quality standards for potable water supply. Microbial standards for foods. Sanitation in food service institution.

Section-D

Method of cleaning and disinfection. Detergents and Sanitizer. Recommended International code of hygiene for food products.

Recommended Books:

FTL-206: SUGAR PROCESSING AND REFINING

Credits: 3-0-0

Time: 3 Hours

Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Note: Students can use the Non-Programmable scientific calculator

Section-A
1. Juice extraction, maceration and imbibitions, mill sanitation. Color and coloured Nin-sugars, removal of color by precipitates and adsorbents. Composition of cane and beet juice- their differences, principles of cane juice clarification, different processes of cane juice clarification.

2. Ion exchange process, role of Ion exchange resins, Application of Ion exchange, different techniques of Ion exchange, regeneration of resins, plant requirement-operation and economics.

3. Settling tank, and different types of clarifier. Plate and frame type filter presses, continuous filter. Juice heaters, heat exchangers, use of vapours and steam economy.

4. Evaporation-study of different types of evaporators multiple effect, vapour cell/preevaporators-Vapour bleeding systems, condenser barometric, multijet.

Section-B
5. Syrup: Syrup brix and pH and their role in pan boiling, treatment/clarification of syrup.
6. Classien’s theory of pan boiling. Concept or Massecuite boiling, different types of massecuite boiling i.e., 2M/C boiling, 3M/C boiling, 4 M/C boiling. Ideas of purities of different intermediate massecuite and molasses. False grain and conglomerates formation and their removal.
7. Concept of crystallization of sugar in crystallizer, factors affecting the rate of crystallization, Air cooled and water cooled crystallizers.
8. Theory of centrifugals, different types of drive, gravity factor numerical based upon G.F. Batch type and continuous type centrifugals.
Section-C


10. Storage of Sugar, Quality of Sugar, Storage of Molasses, Precaution to be taken during storage

Section-D

11. Sugar Beet: Beet Storage: Beet silos or piles, equipment used, type of pile covering, factors affecting piling losses, reclaiming, fluming operation.


Recommended Books:


Teaching Methodologies
The Core Module Syllabus for Environmental Studies includes class room teaching and field work. The syllabus is divided into 8 Units [Unit-1 to Unit-VII] covering 45 lectures + 5 hours for field work [Unit-VIII]. The first 7 Units will cover 45 lectures which are class room based to enhance knowledge skills and attitude to environment. Unit-VIII comprises of 5 hours field work to be submitted by each candidate to the Teacher in-charge for evaluation latest by 15 December, 2019.

Exam Pattern:
End Semester Examination- 75 marks
Project Report/Field Study- 25 marks [based on submitted report]
Total Marks- 100

The structure of the question paper being:

Part-A, Short answer pattern with inbuilt choice – 25 marks
Attempt any five questions out of seven distributed equally from Unit-1 to Unit-VII. Each question carries 5 marks. Answer to each question should not exceed 2 pages.

Part-B, Essay type with inbuilt choice – 50 marks
Attempt any five questions out of eight distributed equally from Unit-1 to Unit-VII. Each question carries 10 marks. Answer to each question should not exceed 5 pages.

Project Report / Internal Assessment:

Part-C, Field work – 25 marks [Field work equal to 5 lecture hours]
The candidate will submit a hand written field work report showing photographs, sketches, observations, perspective of any topic related to Environment or Ecosystem. The exhaustive list for project report/area of study are given just for reference:

1. Visit to a local area to document environmental assets: River / Forest/ Grassland / Hill / Mountain / Water body / Pond / Lake / Solid Waste Disposal / Water Treatment Plant / Wastewater Treatment Facility etc.
2. Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
3. Study of common plants, insects, birds
4. Study of tree in your areas with their botanical names and soil types
5. Study of birds and their nesting habits
6. Study of local pond in terms of wastewater inflow and water quality
7. Study of industrial units in your area. Name of industry, type of industry, Size (Large, Medium or small scale)
8. Study of common disease in the village and basic data from community health centre
9. Adopt any five young plants and photograph its growth
10. Analyze the Total dissolved solids of ground water samples in your area.
11. Study of Particulate Matter (PM$_{2.5}$ or PM$_{10}$) data from Sameer website. Download from Play store.
12. Perspective on any field on Environmental Studies with secondary data taken from Central Pollution Control Board, State Pollution Control Board, State Science & Technology Council etc.
Unit-I
The multidisciplinary nature of environmental studies
Definition, scope and importance, Need for public awareness
(2 lectures)

Unit-II
Natural Resources: Renewable and non-renewable resources:
Natural resources and associated problems.
(a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
(b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
(c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
(d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
(e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
(f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
• Role of an individual in conservation of natural resources.
• Equitable use of resources for sustainable lifestyles.
(8 Lectures)

Unit-III
Ecosystems
• Concept of an ecosystem
• Structure and function of an ecosystem
• Producers, consumers and decomposers
• Energy flow in the ecosystem
• Ecological succession
• Food chains, food webs and ecological pyramids
• Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)
(6 Lectures)

Unit-IV
Biodiversity and its conservation
• Introduction – Definition: genetic, species and ecosystem diversity
• Biogeographical classification of India
• Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
• Biodiversity at global, national and local levels
• India as a mega-diversity nation
• Hot-spots of biodiversity
• Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
• Endangered and endemic species of India
• Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity
(8 Lectures)
Unit-V

Environmental Pollution
Definition
- Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear pollution
- Solid waste management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides (8 Lectures)

Unit-VI

Social Issues and the Environment
- From unsustainable to sustainable development
- Urban problems and related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation
- Consumerism and waste products
- Environmental Protection Act, 1986
- Air (Prevention and Control of Pollution) Act, 1981
- Water (Prevention and control of Pollution) Act, 1974
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation
- Public awareness (7 Lectures)

Unit-VII

Human Population and the Environment
- Population growth, variation among nations
- Population explosion – Family Welfare Programmes
- Environment and human health
- Human Rights
- Value Education
- HIV / AIDS
- Women and Child Welfare
- Role of Information Technology in Environment and Human Health
- Case Studies (6 Lectures)

Unit-VIII

Field Work
- Visit to a local area to document environmental assets river/forest/grassland/hill/mountain
- Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
- Study of common plants, insects, birds
- Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)
References:
2. Down to Earth, Centre for Science and Environment, New Delhi.
9. State of India’s Environment 2018 by Centre for Sciences and Environment, New Delhi
ECL-210: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Credits: 3-1-0

Time: 3 Hours

Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Note: Students can use the Non-Programmable scientific calculator

Section-A

1. Electric Current and Ohm’s Law
   Ohm’s Law, Resistance in Series, Resistance in Parallel, Division of current in Parallel circuits, Equivalent Resistance, Numericals.


3. Electromagnetic Induction and A.C. Fundamentals:
   Faraday’s law of Electromagnetic Induction, Generation of Alternating voltage, current, simple wave form, cycle Time period, frequency, Amplitude, phase, phase difference.

Section-B


Section-C

6. **D.C. Generators and D.C. Motors:** Generator Principle, Construction and working of Generator, Motor Principle, Comparison of Generator and Motor action, comparison of shunt, series Motors, losses and Efficiency Powerstages, Speed control of D.C. Motors.

7. **Electronic Devices:** Semiconductors, Bipolar Junction Transistor., transistor circuit configuration transistor characteristics, Field Effect Transistor.

Section-D

8. Amplifiers, Classification, Concept of feedback amplifiers.


10. Introduction to DSO (Digital Storage Oscilloscope) and CRO (Cathode Ray Oscilloscope), Electronic versus electrical Instruments.

**Recommended Books:**

FTP-221: BASIC MICROBIOLOGY

Credits: 0-0-2

Note: Students can use the Non-Programmable scientific calculator.

1. Introduction to Microscopic techniques in the identification of Microorganisms

2. Specific Staining techniques.

3. Isolation of pure cultures of bacteria, yeasts, and moulds.

4. Identification on the basis of Morphology and Physiology.

5. Preparation of nutrient broth.

6. Preparation of media with nutrient agar, PDA and special media.

1. Determination of total soluble solids by:
   a) Refractometer.
   b) Brix Spindle
   c) Drying Method.
2. Determination of Pol and calculation of purities juices, syrup, massecuites and other boiling house products.
3. Determination of ash (%) in juices, syrup, massecuites, molasses etc.
   a) Carbonated Ash.
   b) Sulphated Ash.
4. Determination of sucrose and gravity purity of juice, syrup, massecuite and other boiling house products by double polarization using Jackson and Gill’s method.
5. Determination of sucrose and gravity purity of molasses and boiling house products by Fehling’s solution method
6. Determination of reducing sugar in Juices, syrups, massecuites, molasses, etc. by Lane and Eynon method.
7. Determination of phosphate content in juice by Ammonium Molybdate method
8. Determination of SO₂ content in juices and syrup.
10. Analysis of lime for available CaO by Sucrose Method.
11. Analysis of Commercial Phosphoric acid.
12. Analysis of Blankit (Sodium Hydrosulphite)
13. Visit to the sugar complex.

**Recommended Books:**

B.TECH. (FOOD TECHNOLOGY) SEMESTER-IV
(Credit Based Evaluation & Grading System)

FTL-252: CEREALS AND PULSES TECHNOLOGY
Credits: 3-1-0

Time: 3 Hours

Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Note : Students can use the Non-Programmable scientific calculator

Section-A
Rice: Production, composition, structure and characteristics of varieties, classification and properties, milling, criteria of rice quality and parboiling of paddy, processed foods from rice, rice milling, Machinery and modern rice mill, stabilization of rice bran, by products of rice milling and their uses specifically rice bran oil.

Section-B
Wheat: Production, composition, structure and characteristics of varieties, classification and properties, criteria of grain and flour quality, wheat conditioning and milling, air classification of flour, Flour and its treatment, rheology and chemistry of dough, physical dough testing instruments. Technology of baking bread, biscuit, cookies, cakes, bakery ingredients and their functions. Durum wheat and pasta products like macaroni, noodles and sphagatti. Processing of wheat flakes.

Section-C
Corn: Production, corn type, composition, structure and characteristics of varieties, dry and wet milling of corn, composition and properties of corn starch, corn based ready-to-eat breakfast cereals, alkaline cooked products, tortillas, nixtamalized corn flours, snacks from corn, tortilla chips, extruded snacks, Corn oil – composition, processing and utilization, corn starch modification and uses, corn sweeteners such as glucose syrup, high fructose corn syrups, dextrose and maltodextrin.

Section-D
Barley: Production, structure, composition, milling, malt production, and malting chemistry and technology.
Recommended Books:

1. Technology of Cereals. by N.L. Kent, 1994

2. Wheat Chemistry and Technology- Pomerenz.


5. Pulse Chemistry and Technology by B. Tiwari and N. Singh (RSC).
B.TECH. (FOOD TECHNOLOGY) SEMESTER-IV
(Credit Based Evaluation & Grading System)

FTL-253: FRUITS AND VEGETABLES TECHNOLOGY

Credits: 3-1-0
Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Time: 3 Hours

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Note: Students can use the Non-Programmable scientific calculator

Section-A

Prepackaging of fresh fruits and vegetables. Storage techniques for fresh fruits and vegetables.
Processing of fruit juices.

Section-B

Manufacturing of fruit juices concentrates. Processing of vegetable juice, puree and pastes.
Preparation of jam, jellies and marmalades.

Section-C


Section-D

Drying and dehydration of fruits and vegetables. Freezing and frozen storage of fruits and vegetables. Waste management in fruits and vegetable processing units.

Recommended Books:
FTL-254: INDUSTRIAL MICROBIOLOGY

Credits : 3-0-0

Time: 3 Hours

Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Note : Students can use the Non-Programmable scientific calculator

Section-A
Economic activities of microorganisms. Propagation of food, food and baker yeasts. Technology of production of alcohol, glycerol and beer. Mechanism of alcohol and glycerol fermentation. Production of wine and other alcoholic beverages (Whiskey, rum etc.). activities of lactic acid bacteria and industrial, production of lactic acid.

Section-B
Activities of acetic acid bacteria and production of vinegar, sorbose and dihydroxyacetone. Production of dextrons, amino acid fermentation, metabolic controls in industrial fermentation,


Section-C
Microbial production of vitamins B-2 and B-12. Production, Isolation and uses of microbial enzymes, immobilized enzymes and their applications, production of glucose and fructose and starch by enzymatic methods. Production of mushroom mycelium by submerged culture process. Production of algal protein and recent advances.

Section-D
Recommended Books:

1. Industrial Microbiology - Prescott and Dunn., 1983
FTL-258: SUGAR INDUSTRY CO-PRODUCTS

Time: 3 Hours

Mid Semester Marks : 20
End Semester Marks : 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Note : Students can use the Non-Programmable scientific calculator

Section-A

General Introduction: Co-product of cane sugar and Beet sugar industry.

Bagasse: Physical and Chemical characters fuel value of bagasse, Ways and means of sparing Bagasse, Handling and Storage of Bagasse, Manufacture of pulp and paper from Bagasse, Manufacture of particle board, fibre board and corrugated board, Use of bagasse as a fuel, production of bagasse production gas, Miscellaneous products from Bagasse; (a) Furfural (b) Cellulose (c) Xylitol (d) Poultry Litter (e) Soil Conditioning (f) Plastics (g) Cattle Feeds (h) Charcoal and Activated Carbon.

Section-B

Molasses: Characteristics of molasses, different types of molasses and their comparison in production and composition, De-sugarization of molasses, Molasses for products of ethyl alcohol, Recovery of CO2 in distilleries, Molasses for production of: (a) Yeast (b) Monosodium Glutamate (c) Lysine (d) Citric acid (e) Tartaric Acid (f) Oxalic Acid (g) Aconitic Acid (h) Acetone Butanol Ethanol ABS. Use of molasses in live stock feeds, Molasses as fuel, fertilizer in briquetting.

Section-C

Filter Mud: Characteristics, different types and their comparison, Use of filter Mud as a) fertilizer b) fuel c) cattle feed. Filter Mud for manufacture of a) Cane wax b) Biogas c) Cement
Section-D

Sugar cane green top: Composition and utilization.

Specialty Sugar Products: Brown or soft sugar, areado soft sugar process, liquid sugar production, microcrystalline sugar.
Sucrose derivatives: Brief introduction.

Recommended Books:

B.TECH. (FOOD TECHNOLOGY) SEMESTER-IV
(Credit Based Evaluation & Grading System)

FTL-255: FLUID FLOW AND HEAT TRANSFER

Credits: 3-1-0

Time: 3 Hours

Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.
Note : Students can use the Non-Programmable scientific calculator

Section-A


Section-B


Section-C


Recommended Books:


B.TECH. (FOOD TECHNOLOGY) SEMESTER-IV
(Credit Based Evaluation & Grading System)

FTL-256: MECHANICAL OPERATIONS

Credits: 3-1-0
Max. Marks: 100
Mid Semester Marks : 20
End Semester Marks : 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Note: Students can use the Non-Programmable scientific calculator

Section-A

1. Size Reduction

   General principles, considerations governing equipment selection, size reduction equipment, modes of operation of size reduction plant, calculation of energy requirements for comminution of solids, disintegration of fibrous materials-slicing, dicing, shredding and pulping. Screening terminology, types of screens, effectiveness of screens, screen analysis for particle size determination.

2. Material Handling

   Theory, types of material handling equipments like belt conveyor, screw conveyor, bucket elevator and pneumatic conveyor.

Section-B

3. Filtration

   Theory of filtration, filtration equations for constant pressure and constant rate filtration, filtration equipments, filter media and filter aids.
Section-C

4. Sedimentation

Theory, free and hindered settling, sedimentation equipments

5. Centrifugal Separation

Theory, basic equation, rate of separation, liquid separation, gas-solid separation, centrifugation equipments.

Section-D

6. Mixing

Theory, measurement of mixing, rates of mixing, types of mixers – mixers for liquids of low or moderate viscosity, mixers for high viscosity pastes and plastic solids, mixers for dry solids.

Recommended Books:


5. Unit Operations of Agricultural Processing by K M Sahay and K K Singh; Vikas Publishing
FTP-271: CEREALS AND LEGUMES TECHNOLOGY

Credits: 0-0-2

Note: Students can use Non-Programmable scientific calculator.

1. Wheat Technology:

   Evaluation of properties of Wheat and milled products, Physical, Chemical and Rheological.
   Experiment baking bread, biscuit, cakes, and pastries.
   Evaluation of baked bread.
   Experimental milling of wheat.

2. Rice Technology –evaluation of properties of rice, physical and chemical-

   Cooking quality of rice.
   Experiment on parboiling, evaluation of quality.
   Milling of rice, assessment of degree of polishing,
   Evaluation of extruded products.
   Milling of pulses.

3. Legumes Technology-

   Evaluation of properties of legumes (Physical, Chemical and cooking)
   Production of isolates and Concentrates
   Production of different soybean products. Evaluation
   and Production of extruded products

4. Industrial Visit.
FTP-272: FRUITS AND VEGETABLES TECHNOLOGY

Credits: 0-0-2

Note: Students can use the Non-Programmable scientific calculator.

1. Preparation of fruit juices, squash, R-T-S, Nectar.

2. Preparation of jam, jelly, marmalade preserve, candied.

3. Preparation of fruit juice concentrate and powder.

4. Preparation of tomato products.

5. Preparation of pickles, chutneys, sauces.

6. Dehydration of fruits and vegetables.

7. Freezing of fruits and vegetables.

8. Quality control of processed products.

9. Can seaming operation and canning of fruits and vegetables.
Note: Students can use the Non-Programmable scientific calculator.

Production, recovery and control tests for the following fermentation products.

1. Alcohol
2. Baker’s yeast
3. Citric acid
4. Glutamic acid
5. Amylases
6. Pectinase
7. Wine
8. Cider
9. Miso
10. Tempeh
11. Yoghurt
12. Riboflavin
B.TECH. (FOOD TECHNOLOGY) SEMESTER-IV
(Credit Based Evaluation & Grading System)

FTP- 276: SUGAR INDUSTRY CO PRODUCTS

Credits: 0-0-2

1. Analysis of Molasses for:
   a) Bx (%), Pol (%) and Purity
   b) Ash (%)
   c) Reducing sugar (%)
   d) Total sugars

2. Analysis of Sugarcane for:
   a) Pol (%)
   b) Fibre (%)

3. Analysis of Bagasse for:
   a) Pol (%)
   b) Moisture (%)

4. Analysis of Press Mud for:
   a) Pol (%)
   b) Moisture (%)

5. Sieving and Grading of Sugar.

6. Preparation of seed slurry by:
   a) Precipitation method
   b) Grinding method.

7. Colour measurement using spectrophotometer by ICUMSA method in
   a) White sugar
   b) Raw sugar

8. Analysis of Gur for:
   a) Bx (%), Pol (%) and Purity
   b) Ash (%)
   c) Reducing sugar (%)
   d) Total sugars

9. Determination of turbidity of Juice using Nephelometer

10. Analysis of Electrolytic Chlorine

11. Analysis of Ammonium bifluoride

12. Analysis of Commercial formalin

13. Visit to a sugar/distillery/Brewery

Recommended Books:

FTP-274: MECHANICAL OPERATIONS

Credits: 0-0-2

Note: Students can use Non-Programmable scientific calculator.

1. Study of working principle and operation of various types of grinders.

2. Study of working principle and operation of various types of crushers.

3. Sieve analysis to determine particle size of flour sample.

4. Design calculations of belt conveyor.

5. Design calculations of screw conveyor

6. Design calculations of bucket elevator.

7. Study of filtration operation.

8. Study of mixing operation.

9. Visit to a food industry.
B.TECH. (FOOD TECHNOLOGY) SEMESTER-V
(Credit Based Continuous Evaluation Grading System)

FTL-301: DAIRY TECHNOLOGY

Credits: 3-1-0

Note: Students can use the Non-Programmable scientific calculator.

UNIT-I

1. Chemical composition, nutritive value and physico-chemical characteristics of milk.
2. Microbiology of Milk.
4. Special milks.
5. Synthetic milk and its detection.
6. Various analytical techniques of determination of milk quality.

UNIT-II

7. Chemistry and technology of cream, butter, margarine and ghee manufacture
8. Production of ice cream and other frozen desserts.
10. Chemistry and Technology of Milk Powders (full fat, Skim-milk and instantized milk powders).

UNIT-III

11. Technology of cheese and other fermented milk products.
13. Fortification of milk products with different nutrients.
15. Milk plant hygiene, sanitation and waste utilization.

Recommended Books:

1. Technology of Dairy Products by Early, R.
2. Outlines of Dairy Technology by De. S.
FTL-302: FISH, MEAT AND POULTRY TECHNOLOGY

Credits: 3-1-0

Note: Students can use the Non-Programmable scientific calculator.

UNIT-I

UNIT-II
Canning of meat and meat products, Restructured meat products, sausages, curing and smoking of meat. Disposal and utilization of meat industry by-products. Modified atmospheric packaging of meats. MFPO and sanitation of abattoir.

UNIT-III

Recommended Books:
5. Fish Technology - R.J. Roberts.
FTL-303: FATS AND OIL TECHNOLOGY

Credits: 3-0-0

Note: Students can use the Non-Programmable scientific calculator.

UNIT-I
Status of oils and fats and Indian Economy.
General chemistry, Analytical methods for characterization.
Quality standards of edible oils and fats.

UNIT-II
Antioxidants and rancidity, oil and fats in diet, nutrition and disease.
Detection of adulteration. Extraction and clarification of vegetable oil.
Modifications of the properties of oils and fats including chemical processes.

UNIT-III
Confectionery plastic fats, preparation of various products including different shortenings, margarine, salad dressing and mayonnaise, imitation of dairy products, low calorie spreads, Animal fat, oil derivatives.
Technology of oilseed protein isolate.

Recommended Books:
1. Fats and Oil - Bailey.
2. The Chemistry and Technology of Edible Oils and Fats, P.N. Williams and J. Devine.
FTL-306: MASS TRANSFER

Credits: 3-0-0

Note: Students can use the Non-Programmable scientific calculator.

UNIT-I
Theory of diffusional processes - molecular diffusion in fluids, measurement of diffusivity. Theory of interphase mass transfer, mass transfer coefficients and mass transfer theories. Analogies between heat, mass and momentum transfer.

UNIT-II
Crystallization and absorption: Theory of crystallisation, material and energy balance calculations, introduction to crystallizer design. Introduction to the principles of absorption. Distillation: Vapor-Liquid equilibria, relative volatility batch and equilibrium distillation, steam distillation, molecular distillation, azeotropic and extractive distillation, enthalpy concentration diagram. Theory of rectification column design.

UNIT-III
Extraction: Fundamental principles of liquid - liquid extraction, selectivity, and choice of solvent. Material balances in stage operations and principles of the graphical methods in determination of number of equilibrium stage. Fundamental principles of leaching operation and material balance calculations.

Recommended Books:

1. Unit Operation in Chemical Engineering – Mcabe and Smith.
3. Chemical Engineering – Coulson and Richardson
UNIT - I

Computerization, Importance of Computerization in food industry and IT applications in food industries.

Computer operating environments and information system for various types of food industries. Introduction to a Barcharts and Piecharts and the procedure to develop a barchats and piecharts on given Data.

Introduction to Software and Programming Languages, Properties, Differences of an Algorithm and Flowcharts, Advantages and disadvantages of Flowcharts and Algorithms.

Introduction, Fundamentals and advantages of “C”
Steps in learning “C” (Character set, Identifiers, Keywords)
Steps in learning “C” (Data types, Constants, Variables, Escape sequences) IT Applications in Food Industry

Steps in learning “C” (Operators, Statements)
Steps in learning “C” (Header Files, Input and Output functions: Formatted I/O functions Unformatted I/O functions)

UNIT-II

Basic Structure of a simple “C” program
Decision Making/Control Statements (If statement, if else statement, ladder if statement, switch statement)
Branching, Concept of Looping and Looping statements (for loop, do while loop)
Concept of Arrays and Types of Arrays (Single, Double and Multi dimensional Arrays)

UNIT-III

Concept of Functions (Defining a function and Function Prototypes, Types of functions: Library functions and User defined functions)
Concept of various types of User Defined Functions (i.e., About 4 types) Concept of a String Library Functions Concept of Pointers, Structures and Unions Introduction to a Data Structures
FTP-321: DAIRY TECHNOLOGY

Credits: 0-0-2

Note: Students can use the Non-Programmable scientific calculator.

1. Quantitative estimation of milk constituents such as moisture, % TS, ash, and fat.
2. Determination of titrable acidity of milk.
3. Determination of specific gravity of milk and observe effect of water addition on it.
4. Performance of platform tests on given sample of milk.
5. Detection of adulterants and preservatives in milk.
7. Preparation of sterilized flavored milk.
8. Preparation of
   a) Butter
   b) Ghee
   c) Ice Cream
   d) Paneer and Chhana
   e) Milk Powder
   f) Khoa
9. Visit to milk processing plant.
FTP-322: FISH, MEAT AND POULTRY TECHNOLOGY

Note: Students can use the Non-Programmable scientific calculator.

1. Determination of egg constituents such as ash/ Total solid/ moisture.
2. Determination of Specific gravity of eggs.
3. Determination of internal quality of eggs.
4. Determination of Haugh units of eggs.
5. Preparation of egg pickle.
6. To determine effect of different time and temperature combination condition on formation of iron sulfide in eggs.
7. To study slaughtering and dressing of poultry bird.
8. To make retail cuts of dressed chicken and calculating percentage yields.
9. To determine meat to bone ratio of chicken.
11. Preparation of meat block.
12. Dressing of fish and calculation of dressing percentage.
13. To determine meat to bone ratio of fish meat.
FTP-323: FATS AND OIL TECHNOLOGY

Credits: 0-0-2

Note: Students can use the Non-Programmable scientific calculator.

1. Experimental expeller processing of oilseeds.
2. Solvent extraction process.
3. Determination of Iodine value, saponification value, R.M. value, Kirschner, Polenski value, melting point and peroxide value of fats and oils sample.
4. Adulterants in fats and oils.
5. Imitated dairy products, margarine etc.
6. Production of protein concentrates and isolates.
7. Determination of anti-oxidant-used in oil.
B.TECH. (FOOD TECHNOLOGY) SEMESTER-V
(Credit Based Continuous Evaluation Grading System)

FTP-326: COMPUTER APPLICATIONS IN FOOD INDUSTRY

Credits: 0-0- 2

1. Application of MS Excel to solve the problems of food technology
   Introduction to a C compiler and How to handle the C compiler (Controllers used in C Compiler)
2. Statistical quality controls of food Developing and executing simple C programs (By using various operators used in “C”).
3. Sensory Evaluation of food Developing and executing simple “C” programs (By using some mathematical and logical operation)
4. Chemical kinetics in Food processing Developing and executing simple “C” programs (By using Control statements: if, if-else, multiple if-else)
5. Use of Word Processing software (MS- Power Point) for creating reports and presentation Developing and executing simple “C” programs
   (By using Control statements: nested if “s, conditional operator, and switch statements)
6. Familiarization with the application of computer in food industries
   Developing and executing simple “C” programs (By using loops: while, do- while loops)
7. Milk plant, dairy units, fruit and vegetable processing unit familization with software related to food industries. Developing and executing simple “C” programs (By using loops: for loop)
8. Ergonamics application in the Food industries. Developing and executing simple “C” programs (By using arrays: single (or) one dimensional arrays)
9. Developing and executing simple “C” programs (By using arrays: two dimensional arrays)
10. Developing and executing simple “C” programs (By using four types of Functions)
11. Developing and executing simple “C” programs (By using a string functions :
    strlen ( ), strlen ( ), strcat ( ))
12. Developing and executing simple “C” programs
    (By using a string functions: strcat( ), strlwr( ), strupr( ))
13. Developing and executing simple “C” programs (By using structures, unions)

Recommended Books:
1. Let us "C" – Yeswanth Kanethkar
3. Data Structures – Mark Allen Waise
4. M. S. Office – Microsoft Corp
FTL-351: FOOD REGULATIONS AND QUALITY CONTROL

Note: Students can use the Non-Programmable scientific calculator.

UNIT I
Introduction, Objective and importance of general principles of quality control, Quality attributes - color, gloss, viscosity and consistency, size and shape and texture.

Flavor and Taste. Introduction to sensory evaluation of foods. Different sensory evaluation techniques.

UNIT II

UNIT III

Recommended Books:
1. Advances in Food Research - By Academic Press.
2. Quality Control for Food Industry - By Krammar and Twigg.
FTL-352: APPLICATIONS OF ENZYMES IN FOOD INDUSTRY

Note: Students can use the Non-Programmable scientific calculator.

Credits: 3-0-0

UNIT-I

2. Enzyme kinetics, actors affecting enzyme action.
3. Immobilized enzymes.
4. Sources of enzymes and their production.

UNIT-II

5. Role of enzymes in meat tenderization
6. Significance of enzymes in starch industry- high fructose corn syrups, glucose syrups, monohydrate dextrose.
7. Application of amylases, proteases, lipoxidase, lipases and pentosanes in baking industry.

UNIT-III

8. Applications of enzymes in milk and milk products.
9. Enzymes in fruits and vegetables processing-clarification and debittering.
10. Enzymes in beer and wine making

Recommended Books:

Food Enzymes by Reed.
UNIT-I

1. **Introduction:** Introduction to biochemical engineering, chemical engineering, microbiology, biotechnology and biochemistry.

2. **Cell growth:** Introduction, quantifying cell concentration, growth patterns and kinetics in batch culture, effect of environmental conditions on growth kinetics, heat generation by microbial growth.

UNIT-II

3. **Enzymes:** Production of crude enzyme, isolation and purification, immobilized enzymes and bio-reactor. Immobilization techniques, kinetics, industrial application and product recovery.

4. **Enzyme kinetics:** Introduction, mechanistic models for simple enzyme kinetics, Michaelis-Menten type kinetics, effects of pH and temperature.

UNIT-III

5. **Fermenter design, control and scale up:** Aeration and agitation in fermenter, oxygen supply and demand in microbial processes - single and multiple bubble aeration, oxygen transfer in fermentation, types of spargers, etc.

6. **Continuous fermentation.**

**Recommended Books:**


UNIT-I
1. Definition, Functions of Food package
2. Hazards acting on package during transportation.
3. Various packaging materials - rigid, semi rigid and flexible and their properties.
4. Principles of manufacture, types and uses of - wood, paper, paper-board, corrugated fiber board
5. Use of Plastic, metal and glass in food packaging

UNIT-II
7. Special packaging methods: Retortable packaging, Aseptic, vacuum, shrink packaging.
10. Shelf life prediction.

UNIT-III
11. Edible films and coatings
12. Packaging requirements of different products:
   Dairy products, Flesh foods, Cereal based foods, Fruits and vegetables, Beverages,
   Snack foods, Microwavable foods.

Recommended Books:
1. Fundamentals of Food Packaging by F.A. Paine.
2. Packaging of Food Beverages by F.T. Day.
3. Food Packaging by Saccharow and Grifith.
5. Principles of Food Packaging by R. Heiss.
FTL –357: HUMAN RESOURCES MANAGEMENT IN FOOD INDUSTRY

UNIT-I

UNIT-II

UNIT-III

Recommended Books:
1. Personnel Management : C B Mamoria
2. Principles of Personnel Management : Dawin B Filppo
3. Labour Problems and Social Welfare : R C Saxena
4. Principle and Practice of Marketing in India : CB Mamoria and RC Joshi
UNIT-I
MILLING CONTROL: Technical definitions, fundamental formula for cane, added water, mixed juice and bagasse, calculation of brix percent bagasse, fibre percent bagasse, undiluted juice lost in bagasse percent fibre, added water in mixed juice percent added water in cane. Methods of control-differential and inferential methods, primary extraction, secondary extraction using simple and compound imbibition scheme. Ideal extraction, mill extraction, brix curves, brix free cane water, lost juice percent fibre, reduced mill extraction, E.R.Q.V., Inferential methods for calculation, undiluted juice percent cane, undiluted juice in mixed juice percent cane, added water percent cane and added water per unit cane, indirect method of calculating cane weight. Methods of comparison of milling efficiency of factories.

UNIT-II
BOILING HOUSE CONTROL: S.J.M.formula and its postulates, winter Carp’s formulas, relation between S.J.M. and winter’s formulas. Differences between commercial sugar, standard granulated and equivalent standard Granulated (E.S.G.), calculation of E.S.G., clarification factor, actual molasses percent theoretical molasses and non-sugar in molasses percent non-sugar in mixed juice. boiling house recovery, basic boiling house recovery, boiling house performance and boiling house recovery (E.S.G.) Comparison of boiling house recovery of different factories, virtual purity of waste molasses, reduced boiling house, recovery. Norms of efficiency

UNIT-III

Recommended Books:
2. Standard Fabrication Practice for Cane Sugar Mills Deldan.
3. Handbook of Cane Sugar Engineering. E. Hugot.
5. Handbook of Cane Sugar Tech.: R.B.L. Mathur.
FTP-371: FOOD REGULATIONS AND QUALITY CONTROL

Credits: 0-0-2

Note: Students can use the Non-Programmable scientific calculator.

1. Estimation of moisture content of food sample.
2. Estimation of ash content of food sample.
3. Estimation of extraneous matter present in food sample.
4. Recognition of threshold concentration of primary taste.
5. Recognition of the flavor of food sample.
7. Determination of color of food sample using Hunter Colorimeter.
8. Determination of viscosity of given food sample.
9. Preparation and sensory evaluation of food sample (cookies).
10. Detection of adulteration of desi ghee with vanaspati.
11. Detection of adulterants in milk.
12. Detection of preservatives such as boric acid, borate, carbonates, bicarbonates in milk.
13. Quality control tests in milk.
FTP–372: BIOCHEMICAL ENGINEERING

Credits: 0-0-2

Note: Students can use the Non-Programmable scientific calculator.

1. Preparation of culture media.
2. Demonstration of bacterial growth in batch cultures.
3. Heat inactivation of enzyme, calculation of rate constants, thermal death rate, etc.
4. Measurement of mass transfer coefficient (KLa) by dynamic method, effect of air flow rate and r.p.m.
5. Determination of total dissolved solids in water.
7. Measurement of B.O.D.
8. Measurement of C.O.D.
9. Introduction to fermentation operation, instrumentation etc.
10. Layout of fermentation technology.
FTP-373: PACKAGING TECHNOLOGY
Credits: 0-0-2

Note: Students can use the Non-Programmable scientific calculator.

1. Identification of different types of packaging material.
2. Physical properties of packaging films.
3. Determination of water absorption of paperboard and CFB
4. Uniformity and amount of wax determination.
5. Chemical resistance of packaging material
6. WVTR of different packaging material.
7. Grease resistance of packaging material.
8. Pre-Packaging of Fruits and Vegetables.
10. Determination of continuity of lacquer coating.
11. Determination of tensile strength and heat seal strength of packaging material.
12. To conduct drop test.
FTP: 374 SUGAR INDUSTRY DESIGN LAB.

CREDITS: 0-0-2

1. **Juice Heaters**: To find out the heating surface area, number of tubes, dia, thickness of heaters, shell thickness with respect to hydraulic test pressures.

2. **Evaporator**: With a given heating surface area, to find out the number of tubes, downtake dia, tube plate design, dimension, vapour body thickness under external pressure (Vacuum conditions and calendria design).

3. **Pans**: With given capacities to find the heating surface, down take dimension, shell dimensions with standard tubes, tube plate thickness with heat exchange principle.

4. **Storages Vessels**: Molasses tank for different crushing capacities, so find the thickness of various courses of steel tank, dia and height of steel tank.

5. **Rollers**: Taking into consideration then hydraulic load and bearing journal pressures.

6. **Crystallizers**: To find the dimension parameter of crystallizers taking considerations of the volume of massecuites discharged into crystallizers, cooling temp. at different time intervals.

7. **Condenser**: Design the multi jet condenser, calculate the height of the condenser, cross-section of the condenser, condenser volume size of vapour pipe, diameter of cooling water piper, wt. of cooling water required.

8. **Juice sulphiter**: Design, Dia and height, juice pipe entry, SO2 gas pipeline dia, Milk of line pipe line dia. Required.

9. **Plant layout**: layout of the factory, lay out of the machinery, precautions to be considered.

10. **Visit to sugar complex**

**Books Recommended**

1. Hand book of Sugar Engineering by E.Hugot
2. Engineering Drawing by P.S.Gill
FTL-401: FOOD PROCESS ENGINEERING

Note: Students can use Non-Programmable scientific calculator.

UNIT-I

1. Refrigeration
Selection of refrigerant, components of refrigeration systems, pressure-enthalpy charts and mathematical expressions useful in analysis of vapour compression refrigeration.

2. Freezing
Different types of food freezing systems - indirect contact systems and direct contact systems, freezing time calculations.

UNIT-II

3. Evaporation
Boiling point elevation, types of evaporators, design of single effect and multi effect evaporator, steam economy, vapour recompression systems – thermal recompression, mechanical recompression.

4. Extrusion
Types of extruders – single screw extruder, twin screw extruder and their classification, design features and operational characteristics.

UNIT-III

5. Drying
Theory of drying, bound moisture, free moisture, equilibrium moisture content, critical moisture content, drying rate curves. Engineering aspects of different types of dries including bin drier, tray drier, drum drier, tunnel drier, spray drier, fluidized bed drier, freeze drier.

Recommended Books:

1. Introduction to Food Engineering (3rd Edition) by R. Paul Singh and Dennis R.


4. The Technology of Extrusion Cooking by N. D. Frame, Blackie Academic and Professional, Madras.
FTL- 402: CONFECTIONERY TECHNOLOGY
Credits: 3-1-0

Note: Students can use the Non-Programmable scientific calculator.

UNIT-I
Sugar, glucose and invert syrup and sugar free sweeteners, crystalline and non crystalline confectionary, fondant, hard boiled candy, caramel, toffee, fudge, nut brittles, krokant, praline, truffles, pulled sugar, marshmallows.

UNIT-II
Fruit chews, jellies, gums, pastilles, turkish delight, marzipan, lozenges, panning.
Defects in confectionary: sugar bloom.

Chewing gum and bubble gum. Packaging requirements of sugar confectionary.

UNIT-III

Recommended Books:

2. The Science of Chocolate by Stephent Becett, RSC Publisher.
3. Chocolate, Cocoa and Confectionary Science and Technology by Bernard W. Minifie.
FTL-403: SPICES AND FLAVOUR TECHNOLOGY

Credits: 3-0-0

Note: Students can use the Non-Programmable scientific calculator.

UNIT-I

UNIT-II
2. Spice Processing: Production of whole, ground, essential oil, oleoresins and encapsulated spices from raw spices. Quality standards for processed spices and their products.

UNIT-III

Recommended Books:
2. Spice Statistics- Spice Board, Govt. of India, Ministry of Commerce, Cochin, India
UNIT-I

Plant Location
Concept and factors governing plant location. Locational economics – comparison of rural vs urban plant sites, plant site selection guide.

Plant Layout
Classes of layout problems, objectives, principles and types of layouts – process layout, product layout, combination layout, fixed position layout; methods and tools of plant and factory layouts; plant layout procedures.

Factory Building
Considerations in building design, types of factory buildings, building construction materials for floors, walls, roofs, etc.

UNIT-II

Network Analysis of Processes
Basic terms, objectives and advantages of network analysis, various network techniques, PERT and CPM techniques, smoothing.

Cost Analysis
Fixed cost, variable cost, depreciation, methods of economic analysis, profitability analysis of a plant.

UNIT-III

Layouts
Layouts of different types of food and fermentation industries – canning, dairy, bread, biscuit, beer, tomato processing, rice mill and wheat mill.

Plant Maintenance
Objectives and importance of maintenance, types of maintenance – corrective or breakdown
Maintenance, scheduled maintenance, preventive maintenance and predictive maintenance.

Recommended Books:


FTP-421: FOOD PROCESS ENGINEERING

Credits: 0-0-2

Note: Students can use Non-Programmable scientific calculator.

1. Study of dehydration characteristics of food material using cabinet drier.

2. Study of dehydration characteristics of food material using fluidized bed drier.

3. Study the working principle and operation of freeze drier.

4. Study the working principle and operation of spray drier.

5. Study of psychometrics – use and applications.

6. Study the working principle and operation of an evaporator.

7. Study of design parameters and refrigeration load capacity of a cold storage plant.

8. Determination of freezing time of selected food materials.

9. Study the working principle and operation of an extruder.

10. Visit to a food industry.
B.TECH. (FOOD TECHNOLOGY) SEMESTER-VII
(Credit Based Continuous Evaluation Grading System)

FTP–422: CONFECTIONERY TECHNOLOGY

Credits: 0-0-2

Note: Students can use the Non-Programmable scientific calculator.

To study the preparation of confectionary products

1. Fondant
2. Hard boiled candy
3. Caramel
4. Toffee
5. Butterscotch
6. Pulled sugar
7. Jellies, gums
8. Visit to Confectionery Industry
FTP-423: SPICES AND FLAVOUR TECHNOLOGY

Credits: 0-0-2

Note: Students can use the Non-Programmable scientific calculator.

1. Spice analysis.
2. Identification of whole spices.
3. Determination of Essential oil in spices.
4. Detection of Adulteration in Spices
5. Sensory analysis of flavored foods.
6. Correlation of subjective and objective methods
7. Formulation of compound flavorings.
8. Application of spices and compound flavorings in processed food products.
9. Visit to Spice Processing Unit.
B.TECH. (FOOD TECHNOLOGY) SEMESTER-VII
(Credit Based Continuous Evaluation Grading System)

FTP-424: SEMINAR AND GROUP DISCUSSION

Credits: 0-0-2
FTP-451: INDUSTRIAL TRAINING

Credits: 0-0-16

Students will be required to undertake Practical Training in Industrial establishment in the 8th semester of B. Tech. (Food Tech.) and will have to submit a Industrial Training Report along with original certificate at the completion of the training. Every student will be required to submit a training report in typed standard prescribed format containing a copy of original certificate. The objective of the industrial training is to test the ability of the student to grasp the industrial environment in the field of food processing. Every student will make PowerPoint presentation of industrial training and will be orally examined in the context of the training report.

FTP-452: RESEARCH PROJECT

Credits: 0-0-4

Every student will be required to submit a project report or equipment design report in typed standard form on a topic set by one or more teachers. The objective of the Project Work is to test the ability of the student to tackle an investigational problem in his field of specialization. Every student will be orally examined in the subject incorporated in his Project Report.