4278 – FOOD ENGINEERING-II

Teaching Schedule Per Week			Progressive Assessment	Examination Schedule (Marks)			
				Theory		Practical Ex.	Total
Lectures	Practical	Credits					
3	1	4	50	3 Hrs	100	-	150

Pre-requisite	Source	Semester	Theory	Test	Total	TW	PR	Gr Total
Nil	FOD		75	25	100	50	–	150

Rationale: A technician on a shop floor is expected to supervise the normal processing operations to carry out or supervise routine maintenance work. Therefore, an understanding of unit operations in engineering and of the machinery involved therein is essential. This course in Food Engineering includes all unit operations, which don't involve direct heat transfer such as mixing, size reduction, separation, material handling, etc. The course aims at giving sufficient knowledge and skills for understanding the engineering aspects of various fields of food processing. The practical work supplements the theoretical knowledge of the students and develops skills to cope with daily production/maintenance requirements and select suitable equipment / machinery for processing.

COURSE CONTENT	Hrs	Mks
1. TRANSPORTATION OF SOLIDS, LIQUIDS & GASES	10	20

Solid: Conveyors (apron, screw, open link, belt, pneumatic) and elevators.

Fluids: Flow of fluids, Bernoulli's equation manometer, Venturimeter, pressure gauges. Pumps: Construction and applications. Gases: Blowers, compressors, chimneys and vacuum producing devices metering and filling devices.

2. MECHANICAL SEPARATIONS	20	30
Sorting and grading: Types of graders, screening and screen analysis. Floating and sedimentation. Filtration: Types (batch and continuous) equipment (plate and frame leaf, rotary) filter aids and filter media. Centrifugation: Principles and basis of design of equipment (basket, bowl, tubular, etc.). Crystallisation: Equipment in food processes. Expression: Equipment, solvent extraction, osmosis, reverse osmosis, membrane separation – Osmosis, reverse-osmosis, and ultra filtration.		
3. MIXING AND BLENDING	9	20
Different types of mixers for liquids, pastes, dry powders and specific food operations such as kneaders, conchers, beaters, etc. Emulsions: Theory and equipment, homogenisation.		
4. SIZE REDUCTION	6	20
Methods of sieving and size reduction, equipment (grinding, pulverising, pulping, juicing, mincing, etc)		
5. PACKAGING MACHINES	3	10
Principles of filling of solids on weight and volume basis, filling of liquids.		
Total	48	100

PRACTICALS

Study experiments of the following, with appropriate factory visits:

Conveyors and elevators, Measurements and control devices for fluid flow, pumps, vacuum producing devices, filtration and centrifugation equipment, size reduction equipment, mixing equipment, emulsifying and homogenising equipment.

REFERENCE BOOKS

1. Unit Operations in Chemical Engineering by Maccabe Smith.
2. Food Engineering by S. E. Charm
3. Introduction to Chemical Engineering by Badger Banchevio.