

LECTURE SCHEDULE

Department: Dairy Engineering

Course No. - DTE- 322

Course Title: Material Strength & Dairy Machine Design Credit Hrs- 3 (2+1)

Course Teacher: Dr. Jahangir Badshah

Theory

S. No.	Topics to be covered	No. of Classes
1	Strength of Materials: Basic concepts in Statics and Dynamics. Related Numerical.	01
2	Force Systems. Equilibrium condition, friction, Law of friction and Numerical solutions.	02
3	Second moments of inertia and Parallel axis theorem. Related Numerical.	01
4	Dynamics: Equation of motion. Translation and rotation of a Rigid body.	01
5	Numerical on work and energy in translator and rotary motion.	03
6	Work and mechanics of materials: Stress-Axial Load classification Strain-Hooke's law, stress-strain diagram.	01
7	Poisson's Ratio: Shearing Stresses. Torsion, Torsion formula.	01
8	Numerical on torsion of beam and design of dairy equipments rotating shaft.	02
9	Angle to Twist of circular members. Power transmission shear force and numerical.	02
10	Shear in Beams, Bending Moment in beams. Pure bending of beams and Numerical Solution.	01
11	Bending moment diagrams numerical in different cases of bending.	01
12	Flexural stress, shearing stresses in beams and Numerical Solution.	02
13	Relations between centre, Torsional and flexural loads and Numerical Solution.	01
14	Dairy Machine Design: Procedures, Specification, strength, design factor, factor of safety selection.	01
15	Materials and properties. Static strength, ductility and hardness.	02
16	Fatigue, designing for fatigue conditions.	01
17	Numerical on variable and fatigue stresses.	01
18	Theories of failure of machine parts.	01
19	Stresses in elementary machine parts and Numerical on Keys design, shaft design.	01

20	Design of a drive system.	01
21	Design of length and thickness of belt.	01
22	Bearing: Journal and Anti-friction bearings.	01
23	Selection of ball, tapered roller and thrust bearing.	01
24	Springs, helical and leaf springs.	02
25	Energy stored in springs and numerical on energy stored.	01
26	Design and selection of springs.	02
27	Numerical on design of dairy equipments like pasteurizer	02
28	Application in designing of driving separator of centrifugal cream separator.	01
29	Visit to Workshop tools in a dairy plant.	02
30	Visit to Dairy machineries and their maintenance.	01
31	Design of Couplings and leaf spring.	02
	Total	43

Practical (DTE -322)

S. No.	Practical to be covered	No. of Classes
1	Design problems on applications of work and energy.	01
2	Design problems on applications of linear and angular momentum.	01
3	Design problems on stress-strain diagram evaluation of elastic constants.	01
4	Study on shear force and bending moment diagrams and its applications.	01
5	Design problems on applications of flexural stresses.	01
6	Design problems on applications of shearing stresses in beams.	01
7	Study on system of limits, fits and tolerances and their applications.	01
8	Design stresses in elementary machine parts.	01
9	Design features and applications of shafts. Design features and applications of axles.	01
10	Design features and applications of keys.	01
11	Design features and applications of couplings.	01
12	Design problems on various types of power transmission systems.	01
13	Design features and applications of bearings.	01
14	Design features and applications of springs.	01
15	Design problems on agitator/stirrer.	01
16	Design features of milk silo.	01
17	Design problems on PHE used in Dairy Plant.	01
18	Study of driving mechanism of Centrifugal Cream Separator in Visit to PDP.	01
	Total	18

Suggested Reading:

1. A Textbook of Machine Design by R.S. Khurmi and J. K. Gupta (2006), Eurasia Publishing House (Pvt.) Ltd., Ram Nagar, New Delhi-110 055.
2. Design of Machine Element (Fourth Edition) by V. B. Bhandari (2018), McGRAW HILL Education.
3. A Textbook of Machine Design by P. Sharma, Kataria S. K. & Sons.
4. Machine Design by Hall Alfred, McGRAW HILL Pub.