Ch. Ranbir Singh State Institute of Engineering & Technology, Jhajjar
DEPARTMENT OF MECHANICAL ENGINEERING
3rd Yr. Vth Semester (Mechanical Engineering)

LESSON PLAN

Program	:	**B. Tech**
Year & Sem.	:	**III / V**
Course No	:	**ME-309G**
Course Title	:	**Fluid Machines**
Max Marks	**:**	**75**
No. of Total Lecture	**:**	**52**
Schedule	:	**3L+0T= 3**
Lecturer	:	**Satyapal Yadav**

Recommended Books:

1. Fluid Mechanics and Hydraulic Machines – Mahesh Kumar, Pearson Indian Education Service Pvt. Ltd. India.
2. Hydraulics & Fluid Mechanics – Modi & Seth, Pub. - Standard Book House, N.Delhi
3. Hydraulic Machines – Jagdish Lal, Metropolitan

Lesson Plan:

Lect. No(s)	Ref. No.	Topics to be covered
		Unit I:
1-2	1.1	Impact of free jets: Impulse – momentum principle
3	1.2	jet impingement - at the center of a stationary vane
4-5	1.3	jet impingement - on a moving flat plate, inclined plate
6	1.4	jet impingement - a moving vane and a series of vanes
7-8	1.5	Jet striking tangentially at the tip of a stationary vane and moving vane(s)
9	1.6	jet propulsion of ships, Problems.
10	1.7	Classification – impulse and reaction turbines, water wheels
11	1.8	component parts, construction, operation and governing mechanism of a Pelton wheel, work done,
12	1.9	effective head, available head and efficiency of a Pelton wheel, design aspects, speed ratio, flow ratio
13	1.10	jet ratio, number of jets, number of buckets and working proportions, Performance Characteristics, governing of impulse turbines,
14	1.11	Problems
		Unit II:
15	2.1	Component parts, construction and operation of a Francis turbine
16	2.2	Governing mechanism, work done by the turbine runner
17	2.3	working proportions and design parameters
18	2.4	slow, medium and fast runners

19	2.5	degree of reaction, inward/outward flow reaction turbines
20	2.6	Performance Characteristics, Problems
21	2.7	Component parts, construction and operation of a Propeller
22	2.8	Kaplan turbine, differences between the Francis and Kaplan turbines
23	2.9	draft tube - its function and different forms,
24	2.10	Performance Characteristics, Governing of reaction turbine
25	2.11	Introduction to new types of turbine, Deriaz (Diagonal), Bulb, Tubular turbines
26	2.12	Problems
		Unit III:
27	3.1	Dimensional homogeneity, Rayleigh's method and Buckingham's πtheorem, model studies and similitude
28	3.2	Dimensionless numbers and their significance. Unit quantities, specific speed and model relationships for turbines
29	3.3	scale effect, cavitations – its causes, harmful effects and prevention
30-31	3.4	Thomas cavitation factor, permissible installation height,
32	3.5	Problems
33-34	3.6	Classification, velocity vector diagrams and work done, manometric efficiency, vane shape,
35	3.7	head capacity relationship and pump losses, pressure rise in impeller
36	3.8	minimum starting speed, design considerations, multi-stage pumps
37	3.9	Similarity relations and specific speed, net positive suction head,
38	3.10	cavitation and maximum suction lift, performance characteristics
39	3.11	Brief introduction to axial flow, mixed flow and submersible pumps,
40	3.12	Problems
		Unit IV:
41	4.1	Construction and operational details, discharge coefficient, volumetric efficiency and slip, work and power input
42	4.2	effect of acceleration and friction on indicator diagram (pressure – stroke length plot),
43	4.3	separation, air vessels and their utility, rate of flow into or from the air vessel,
44-45	4.4	maximum speed of the rotating crank, characteristic curves, centrifugal vs reciprocating pumps,
46	4.5	brief introduction to screw, gear, vane and radial piston pumps, and Problems
47	4.6	Function, construction and operation of Hydraulic accumulator
48	4.7	Hydraulic intensifier, hydraulic crane,
49	4.8	hydraulic lift and hydraulic press,
50	4.9	Fluid coupling and torque converter,
51	4.10	Hydraulic ram,
52	4.12	Problems

(Satyapal Yadav)
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