SRI VENKATESWARA COLLEGE OF ENGINEERING

COURSE DELIVERY PLAN - THEORY

Department of Civil Engineering	LP: CE 18402 Rev. No: 00 Date: 10/2/2021
B.E/B.Tech/M.E/M.Tech : B.E. Regulation: R 2018 PG Specialisation : NA Sub. Code / Sub. Name : CE 18402 Applied Hydraulic Engineering Unit I : UNIFORM FLOW	

Unit Syllabus:

Definition and differences between pipe flow and open channel flow - Types of Flow - Properties of open channel - Fundamental equations - Velocity distribution in open channel - Steady uniform flow: Chezy equation, Manning equation - Best hydraulic sections for uniform flow - Computation in Uniform Flow - Specific energy and specific force

Objective:

To understand the types and properties of open channel flow and to analyse the steady uniform flow concepts.

Session No *	Topics to be covered	Ref	Teaching Aids
1	Open Channel Flow definition, Types and Properties of Flow	2/Ch-1/ pg:1-6	PPT
2	Computation of Velocity – Chezy Equation	1/Ch-15/ pg:706-	PPT/BB
3	Computation of Velocity – Manning Equation	711/Ch-15/ pg:706-	PPT/BB
4	Tutorial-I	711	BB
5	Best Hydraulic Section -Rectangular	1/Ch-15/ pg:711-	PPT/BB
6	Best Hydraulic Section –Trapezoidal and Triangular	712/Ch-15/ pg:712-	PPT/BB
7	Best Hydraulic Section -Circular	715/Ch-15/ pg:716-	PPT/BB
8	Tutorial -II	719	BB
9	Computation in Uniform Flow- Specific Energy Curve	2/Ch-2/ pg:42-46	PPT/BB
10	Specific Energy Problems	2/Ch-2/ pg:54-59	PPT/BB
11	Specific Force	2/Ch-2/ pg:60-73	PPT/BB
12	Tutorial-III		BB

Content beyond syllabus covered (if any):

Determination of discharge in open channel by Acoustic Doppler Current Profiler

* Session duration: 50 minutes

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Unit II : Varied Flow

Unit Syllabus:
Dynamic equations of gradually varied and spatially varied flows - Water surface flow profile classifications: Hydraulic Slope, Hydraulic Curve - Profile determination by Numerical method: Direct step method and Standard step method- Applications.

Objective:
To analyse the gradually varied flow profiles in a non- uniform flow using numerical and graphical methods.

Session No	Topics to be covered	Ref	Teaching Aids
13	An introduction to Non-Uniform Flows	2/Ch-4/ pg:157	PPT
14	Dynamic Equation for Gradually Varied Flows	2/Ch-4/ pg:157-160	PPT/BB
15	Dynamic Equation for Spatially Varied Flows	2/Ch-8/ pg:367-369	PPT/BB
16	Tutorial-IV		PPT/BB
17	Classification of channel bottom slopes	1/Ch-16/ pg:790-796	PPT
18	Water Surface Profile Classification	2/Ch-4/ pg:160-182	PPT/BB
	CAT-1		
19	Hydraulic Slope, Hydraulic Curve	2/Ch-4/ pg:160-182	PPT/BB
20	Tutorial-V		PPT/BB
21	Profile Computation by Numerical Methods-Direct Step	2/Ch-5/ pg:203-207	PPT/BB
22	Profile Computation by Numerical Methods-Standard Step	2/Ch-5/ pg:207-220	PPT/BB
23	Applications	1/Ch-16/ pg:796-798	PPT/BB
24	Tutorial-VI		PPT/BB
Content beyond syllabus covered (if any):			

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Unit III : Rapidly Varied Flow

Unit Syllabus:

Application of the energy equation for RVF - Critical depth and velocity - Critical, Sub-critical and Super-critical flow - Application of the momentum equation for RVF - Hydraulic jumps - Types -Energy dissipation - Surges – positive and negative surges.

Objective:

To apply the energy and momentum equation in rapidly varied flows, hydraulic jumps and Surges

Session No	Topics to be covered	Ref	Teaching Aids
25	An introduction to Rapidly Varied Flow	2/Ch-6/ pg: 248-	PPT
26	Critical depth and velocity	1/Ch-9/	PPT/BB
27	Critical, Sub-critical and Super-critical flow	1/Ch-9/	PPT/BB
28	Tutorial - VII		PPT/BB
29	Equation to determine Sequent Depths	1/Ch-16/	PPT/BB
30	Problems related to Sequent Depth	1/Ch-16/	PPT/BB
31	Hydraulic jumps - Types	1/Ch-16/	PPT/BB
32	Tutorial - VIII		PPT/BB
33	Energy dissipators	2/Ch-6/	PPT/BB
34	Surges- positive and negative surges	1/Ch-16/	PPT/BB
35	Surges- positive and negative surges	1/Ch-16/	PPT/BB
36	Tutorial-IX		PPT/BB

Content beyond syllabus covered (if any):

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Impact of Jet on vanes - Turbines - Classification - Impulse turbine -Reaction turbines - Francis turbine, Radial flow turbines, draft tube and cavitation - Propeller and Kaplan turbines - - Performance of turbine - Specific speed - Runaway speed - Similarity laws.

Objective:
To analyse the performance, characteristics and behavior f various types of turbines.

Session No	Topics to be covered	Ref	Teaching Aids
37	Impact of Jets on Plates- Stationery and moving	1/Ch-13/ pg:606-608	PPT/BB
38	Impact of Jets on Vanes- Stationery and moving	1/Ch-13/ pg:607-608	PPT/BB
39	Tutorial -X		PPT/BB
	CAT-2		
40	Turbine introduction and Classification of Turbines	1/Ch-21/ pg: 1021-1027	PPT/BB
41	Performance and Characteristics curves for Pelton Turbine	1/Ch-21/ pg: 1027-1034	PPT/BB
42	Performance and Characteristics curves for Pelton Turbine	1/Ch-21/ pg: 1027-1034	PPT/BB
43	Tutorial- X1		PPT/BB
44	Performance and Characteristics curves for Francis Turbine	1/Ch-21/ pg: 1035-1040	PPT/BB
45	Draft tube and Cavitation	1/Ch-21/ pg: 1040-1042	PPT/BB
46	Performance and Characteristics curves for Kaplan Turbine	1/Ch-21/ pg: 1042-1044	PPT/BB
47	Run away speed and Similarity laws	1/Ch-22/ pg: 1087-1107	PPT/BB
48	Tutorial - XII		PPT/BB
Content beyond syllabus covered (if any):			

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Unit Syllabus:

Centrifugal pumps - Minimum speed to start the pump - NPSH - Cavitations in pumps - Operating characteristics - Multistage pumps - Reciprocating pumps - Negative slip - Flow separation conditions - Air vessels, indicator diagrams and its variations - Savings in work done - Rotary pumps - Gear pump.

Objective:

To analyse the performance, characteristics and behavior of various types of pumps.

Session No	Topics to be covered	Ref	Teaching Aids
49	Pumps – An introduction and its types	3/Ch-19/ pg:938-943	PPT
50	Centrifugal pumps - Minimum speed to start the pump - NPSH	3/Ch-19/ pg:944-972	PPT
51	Cavitations in pumps - Operating characteristics	3/Ch-19/ pg:973-980	PPT/BB
52	Tutorial –XIII		PPT/BB
53	Reciprocating pumps	1/Ch-23/ pg:1131-1136	PPT
54	Tutorial -XIV		PPT/BB
55	Negative slip - Flow separation conditions	1/Ch-23/ pg:1137-1142	PPT/BB
56	Indicator diagrams	1/Ch-23/ pg:1143-1148	PPT/BB
57	Air vessels,	1/Ch-23/ pg:1148-1157	PPT/BB
58	Tutorial -XV		PPT/BB
59	Rotary pumps:	1/Ch-23/Pg no 1027-1056	PPT/BB
60	Gear pump.	1/Ch-23/Pg no 1057-1060	PPT/BB
	CAT-3		
Content beyond syllabus covered (if any):			

Sub Code / Sub Name: CE 18402 Applied Hydraulic Engineering

REFERENCES:

1. Modi P.N and Seth "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard Book House New Delhi. 2003.
2. Subramanya K., "Flow in open channels", Tata McGraw Hill, New Delhi, 2000.
3. Bansal, R.K., "Fluid Mechanics and Hydraulics Machines", 5th edition, Laxmi Publications Pvt. Ltd, New Delhi, 2008

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	Prepared by	Approved by
Signature		
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Designation	Assistant Professor	Professor & Head of the department
Date	10-2-2021	10-2-2021
Remarks *:		

The same lesson plan will be followed during the Academic Year 2021-22.

(Course Instructor)

23/3/2022