Hydraulic Engineering

(Course Code: GR20A2019)

II Year B.Tech - II Semester

(AY 2021-22)

Dr. Mohammed Hussain

Professor

Department of Civil Engineering

Gokaraju Rangaraju Institute of Engineering and Technology

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

Hydraulic Engineering

Course File Check List

S.No.	Name of the Format	Page No.
1	Syllabus	
2	Time Table	
3	Program Educational Objectives	
4	Program Objectives	
5	Course Objectives	
6	Course Outcomes	
7	Students Roll List	
8	Guide lines to study the course books & references, course design & delivery	
9	Course Schedule	
10	Unit Plan/Course Plan	
11	Evaluation Strategy	
12	Assessment in relation to COB's and CO's	
13	Tutorial Sheets	
14	Assignment Sheets	
15	Rubric for course	
16	Mappings of CO's and PO's	
17	Model question papers	
22	Mid-I and Mid-II question papers	
19	Mid-I marks	
20	Mid-II marks	
21	Sample answer scripts and Assignments	
22	Course materials like Notes, PPT's, Videos, etc,.	

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
HYDRAULIC ENGINEERING

Course Code:GR20A2019   **L/T/P/C: 2/0/0/2**
II Year II Semester

Prerequisite: Fluid Mechanics
Course Objectives:
1. Describe the type of channel flow and application of chezys and manning equation
2. Predict the non-uniform flow in open channel flows.
3. Analyze the dimensions of model with prototype.
4. Identify the hydraulic jump losses, surface profiles and channel bed slopes.
5. Compute hydropower and work done by the centrifugal pumps.

Course Outcomes:
1. Describe and predict the various economical channel sections
2. Apply dynamic equation in the uniform flows.
3. Analysing modal and prototype similarities.
4. Visualize behaviour the hydraulic jump, surface profiles of channel flows.
5. Evaluate the efficiency of the pumps and hydropower.

Unit I: Introduction to Open Channel Flow Computation of Uniform flow: Comparison between open channel flow and pipe flow,geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section. Characteristics of uniform flow, Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient 'n'. Most economical section of channel.
 Specific energy, Specific energy curve, critical flow, discharge curve Specific force Specific depth, and Critical depth.

Unit II: Non-Uniform Flow Channel Transitions. Measurement of Discharge and Velocity – Venturi Flume, Parshall Flume,Measurement of Velocity- Current meter, Floats, Hot-wire.Gradually Varied Flow-Dynamic Equation of Gradually Varied Flow, Classification of channel bottom slopes, Classification of surface profile, Characteristics of surface profile. Computation of water surface profile. Direct Step method.

Unit III: Dimensional Analysis and Hydraulic Similitude
Dimensional homogeneity, Rayleigh method, Buckingham's Pi method. Buckingham's πTheorem application of dimensional analysis and model studies to fluid flow problem Dimensionless groups. Similitude, Model studies, Types of models. Definitions of ReynoldsNumber, Froude Number, Mach Number, Weber Number and Euler Number.
Basics of Turbo Machinery: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally.

Unit IV: Hydraulic Jump

Theory of hydraulic jump, Elements and characteristics of hydraulic jump in a rectangular Channel, length and height of jump, location of jump, types, applications and location of hydraulic jump. Energy dissipation and other uses, surges a moving hydraulic jump.

Hydraulic Turbines-I: Layout of a typical Hydropower installation Heads and Efficiencies classification of turbines-pelton wheel, Francis turbine, Kaplan turbine-working, working proportions, velocity diagram, work done and efficiency , draft tube theory and function efficiency. Angular momentum principle, Applications to radial flow turbines. Governing of turbines, characteristic curves.

Unit V: Centrifugal Pumps

Pump installation details-classification-work done- Manometric head minimum starting speed losses and efficiencies-specific speed multistage pumps-pumps in parallel- performance of pumps-characteristic curves- NPSH-Cavitations - Reciprocating pumps basics and definition.

Hydropower Engineering: Classification of Hydropower plants Definition of terms Load factor, utilization factor, capacity factor, estimation of hydropower potential.

Text/Reference Books:

1. Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
2. Open channel Flow, K. Subramanya, Tata McGraw Hill.
3. Open Channel Hydraulics, VenTe Chow, Tata McGraw Hill.
4. Burnside, C.D., "Electromagnetic Distance Measurement," Beekman Publishers.
5. J.F.Douglas, J.M. Gaserek and J.A.Swaffirld, Fluid Mechanics, 5thlongman Edition,2005.
6. Frank.M. White, Fluid Mechanics, Tata Mc. Graw Hill Pvt. Ltd, 4th Edition, 2013.
7. A.K. Mohanty, Fluid Mehanics, Prentice Hall ofIndia Pvt. Ltd., New Delhi, 2nd Edition,1994.
8. Dr. R.K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi.
9. Publications (P) ltd., New Delhi, 9th Edition, 2012.

DEPARTMENT OF CIVIL ENGINEERING

II BTech (GR-18) - II Semester   **AY: 2021-22**   **SEC: A**   **wef : 07-03-2022**

DAY/ HOUR	08:50-9:40	9:40-10:30	10:30-11:20	11:20-12:00	12:00-12:55	12:55-1:50	01:50-2:45
Monday	BEEE	SM II	SM II		SA I	SA I	EAE
Tuesday	BEEE	HE	HE		CADLAB / FM & HM LAB		
Wednesday	SURVEY LAB/ FM & HM LAB			Lunch Break	SA I	HE	BEEE
Thursday	SA I	SA I	BEEE		SM II	HE	HE
Friday	SURVEY LAB/ CAD LAB				SA I	SM II	SM II
Saturday	EAE	EAE	SM II		LIBRARY/ SPORTS/MENTORING		

ROOM NO	
Theory / Tutorial	4222
Lab	SURVEY LAB 4122/FM&HM LAB 4218/19, CAD Lab:4205
II Year Co-ordinator	
Mr.S.Venkatacharyuh	
Class Co-ordinator	
Mrs.I.Chandana	

CODE	Subject Name	CODE	Faculty Name
GR20A2016	Solid Mechanics – II	Dr.KS	Dr.K.Srikanth (Dr.K.S-1594)
GR20A2017	Basic Electrical and Electronics Engineering	Mr.PP	Mr.P.Praveen (Mr.PP-609)
GR20A2018	Structural Analysis – I	Mrs.KHL	Mrs.K.Hemalatha(Mrs.KHL-1177)
GR20A2004	Economics and Accounting for Engineers	Mrs.Y.G	Mrs.Y.Gayathri (Mrs.YG-257)
GR20A2019	Hydraulic Engineering	Dr.MD.H	Dr. Mohammed Hussain(Dr.Mohd.H-861)
GR20A2020	Surveying Lab	Mr.SPR/Mr.AP	Mr.Siva Prasad Raju (Mr.SPR-840)/Mr.A.Prakash (Mr.AP-1502)
GR20A2021	Computer Aided Design Lab	Mr.CVK/Mr.YKR	Mr.C.Vivek Kumar(Mr.CVK-1500)/Mr.Y.Kamala Raju (Mr.YKR-929)
GR20A2022	Fluid Mechanics and Hydraulic Machinery Lab	Mr.SVC/Mr.RR/Mrs.OSDHB	Mr.S.Venkatacharyulu (Mr.SVC-814)/Mr.Rathod Ravinder (Mr.RR-1501)/Mrs.OSD Himabindu (972)

Almanac	
1st Spell of Instruction	07-03-2022 to 30-04-2022
1st Mid-term Examinations	02-05-2022 to 04-05-2022
2nd Spell of Instruction	05-05-2022 to 29-06-2022
2nd Mid-term Examinations	30-07-2022 to 02-07-2022
Preparation	04-07-2022 to 09-07-2022
End Semester Examinations/ (Theory/ Practicals) Regular/Supplementary	11-07-2022 to 30-07-2022

Time Table-Coordinator   **HOD-CE**   **DAA**

Mr.Rathod Ravinder   Dr.C.Lavanya

CODE	Subject	Faculty
GR20A2019	Hydraulic Engineering	Dr .Mohd.Hussain

Gokaraju Rangaraju Institute of Engineering and Technology
(Autonomous)
Department Of Civil Engineering

Vision

> To become a pioneering centre in civil engineering through quality education, innovation, and entrepreneurship.

Mission

- To produce well qualified and talented engineers by imparting quality education.
- To enhance the skills of entrepreneurship, innovativeness, management and life-long learning in young engineers.
- To inculcate professional ethics and make socially responsible engineers.

Program Educational Objectives

1. Graduates of the program will be successful in technical and professional career of varied sectors of Civil Engineering.

2. Graduates of the program will have proficiency to analyse and design real time Civil Engineering projects.

3. Graduates of the program will exhibit management and leadership qualities with good communication skills facilitating to work in a multidisciplinary team.

4. Graduates of the program will continue to engage in life-long learning with ethical and social responsibility.

Program Outcomes

Graduates of the Civil Engineering programme will be able to

1. Apply knowledge of mathematics, science and fundamentals of Civil Engineering.
2. Analyse problem and interpret the data.
3. Design a system component, or process to meet desired needs in Civil Engineering within realistic constraints.
4. Identify, formulate, analyse and interpret data to solve Civil Engineering problems.
5. Use modern engineering tools such as CAD and GIS for the Civil Engineering practice.
6. Understand the impact of engineering solutions in a global, economic and societal context.
7. Understand the effect of Civil Engineering solutions on environment and to demonstrate the need for sustainable development.
8. Understanding of professional and ethical responsibility.
9. Work effectively as an individual or in a team and to function on multi-disciplinary context.
10. Communicate effectively with engineering community and society.
11. Demonstrate the management principles in Civil Engineering projects.
12. Recognize the need for and an ability to engage in life-long learning.

Program Specific Outcomes

1. Recognize the need for a sustainable environment and design smart infrastructure considering the global challenges.
2. Create and develop innovative designs with new era materials through research and development.

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

COURSE OBJECTIVES

Academic Year   : 2021-2022   **Semester** : **II**

Name of the Program: B. Tech Civil Engg.   **Year:** II Year **Section:**

A **Course/Subject**   : Hydraulic Engineering   **Course Code**   :

GR20A2019

Name of the Faculty : Dr. Mohd.Hussain   **Designation:** Professor

Dept.: Civil Engineering

On completion of this Subject/Course the student shall be able to:

S.No	Objectives
1	Describe the type of channel flow and application of Chezy's and Manning's equation
2	Predict the nonuniform flow in open channel flows
3	Analyse the dimensions of model with prototype
4	Identify the hydraulic jump losses, surface profiles and Channel bed slopes
5	Compute hydropower and work done by the centrifugal pumps

Signature of HOD   Signature of
faculty

Date: Date:

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

COURSE OUTCOMES

Academic Year : 2021-2022   **Semester** : **II**

Name of the Program: B. Tech Civil Engg.   **Year:** II Year **Section:**

A **Course/Subject** : Hydraulic Engineering   **Course Code** :
GR20A2019

Name of the Faculty : Dr. Mohd.Hussain   **Designation:**

Professor

Dept.: Civil Engineering

On completion of this Subject/Course the student shall be able to:

S.No	Outcomes
1	Describe and predict the various channel sections
2	Apply dynamic equations in the uniform flows
3	Analysing model and prototype similarities
4	Visualize the behaviour of hydraulic jump and surface profiles of channel flows
5	Evaluate the efficiency of the pumps and hydropower

Signature of HOD   Signature of faculty

Date: Date:

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

STUDENT ROLL LIST

B.Tech Civil Engg. II Yr-II Sem - GR 20   A.Y: 2021 -22

S.No	Reg No	Student Name
1	20241A0101	AADHI SRIKAR RAO
2	20241A0102	ABHIRAM SAI YADAV JANGITI
3	20241A0103	BACCHUGUDAM RITHVIK REDDY
4	20241A0104	BANDLA NAVEEN
5	20241A0105	B.PRANAV SAI
6	20241A0106	BHATTU SUPREETH CHAKRAVARTHY
7	20241A0107	BHUPATHIRAJU HIMANTHAVARMA
8	20241A0108	BOINI HEMANTH
9	20241A0109	CHALLA AJAY KUMAR
10	20241A0110	DONABOINA SRI HARI
11	20241A0111	EPPA ARNAV
12	20241A0112	G L N RAGHURAMAN
13	20241A0113	GANDLA HARSHITH KUMAR
14	20241A0114	GUGGILLA SHASHANK
15	20241A0115	GUNDA SRIKANTH
16	20241A0116	JANGILI SRAVAN KUMAR
17	20241A0117	JANJIRALA SRUTHI
22	20241A0122	JARAPULA JAYANTH
19	20241A0119	K NIKHITHA
20	20241A0121	K.KONDAL
21	20241A0122	KAMMAMPATI UDAYKIRAN
22	20241A0123	KARNE SRITHAN
23	20241A0124	KUNCHALA VARUN KUMAR
24	20241A0125	KUNTA NITHIN REDDY
25	20241A0126	M PAVAN KALYAN
26	20241A0127	MERE MAHESH

27	20241A0128	MOHAMMED AHMED
28	20241A0129	MOTHUKURI LAXMAN
29	20241A0130	MOTTADI ADITYA TEJA
30	20241A0131	MULA SUSHMA SRI
31	20241A0132	NAYINI SWETHA
32	20241A0133	PAIDIPALLY BHARATH
33	20241A0134	P.SAI KIRAN REDDY
34	20241A0135	PASNOOR PAVAN PRATHAP REDDY
35	20241A0136	PATHLAVATH SHIVA NAYAK
36	20241A0137	PEDDIBOINA ANUSHA
37	20241A0138	POREDDY ABHINAV REDDY
38	20241A0139	PULLAGURA SANTHOSH
39	20241A0140	RACHALA BHARATH
40	20241A0141	RADHARAPU SHAJI KUMAR
41	20241A0142	RAMAVATH ROJA
42	20241A0143	RATHLAVATH SAIRAM NAYAK
43	20241A0144	RAVI TEJA PASUNUTHI
44	20241A0146	SADDI SHRIANK REDDY
45	20241A0147	SATHVIKA NARLA
46	20241A0148	SOKKULA KOUSHIKREDDY
47	20241A0149	SRIRAM PANDAVULA
48	20241A0150	T.BHARGAVI
49	20241A0151	T.BHUVANESHWARI
50	20241A0152	S.TEJA RETIESH REDDY
51	20241A0153	TEJAVATH KALYANI
52	20241A0154	TELLAPURAM PRUDHVI RAJ
53	20241A0155	THADEM ROHITH
54	20241A0156	THUMMALA RAJASHEKAR
55	20241A0157	UVSGR KAMESWARA SAI KARTHIK
56	20241A0158	SREERAM VATTEM
57	20241A0159	V VIKESH
58	20241A0160	VENNAM SRIKAR
59	21245A0101	GUMADAVELLI ARUN KUMAR
60	21245A0102	KADIRABAD SRIRAM
61	21245A0103	MANIKONDA NIKITHA
62	21245A0104	PARIDULA PRATHYUSHA
63	21245A0105	PATERU MOUNA

Gokaraju Rangaraju Institute of Engineering and Technology Department of Civil Engineering

GUIDELINES TO STUDY THE COURSE SUBJECT

Academic Year : 2021-2022   **Semester** : **II**

Name of the Program: B. Tech Civil Engg.   **Year:** II Year **Section:**

A **Course/Subject** : Hydraulic Engineering   **Course Code**:
GR20A2019

Name of the Faculty : Dr.Mohd.Hussain   **Designation:**
Professor

Dept.: Civil Engineering

Guidelines to Students

Guidelines to study the Course: Hydraulic Engineering
This course describes the types of channel flows , various economical channel
sections and application of Chezy's and Manning's equations . Students will be able
to study the backwater profiles in nonuniform flow in open channel flows . Model
and Prototype studies are useful in Dam studies. The behaviour of Pelton turbines,
Francis Turbines and Kaplan Turbines   will be studied. The behaviour of centrifugal
pumps and reciprocating pumps also will be studied.
So the students should have the prerequisites
- knowledge of Fluid Mechanics
- knowledge on Mathematics

Where will this subject help?
- Useful in the model studies of hydraulic structures
- Students will be able to compute the backwater profiles
- Students will be able to design and describe the function of Pelton Turbine,
  Francis Turbine , Kaplan turbine & Centrifugal pumps

BOOKS AND MATERIALS

Text Books	
1.	Fluid mechanics and Hydraulic machines by Dr K Subramanya, tata Mc.grawhill Publications
2.	Flow in open channels by Dr K Subramanya, tata Mc.grawhill Publications
3.	A text book of Fluid mechanics and Hydraulic machines by Dr R K Bansal

Suggested / Reference Books	
4.	Hydraulics and fluid mechanics including hydraulic machines by Dr P N Modi and Dr S M Seth, Standard book house publications
5	Open channels Hydralics by Ven Te Chow, tata Mc.grawhill Publications
Web Sites	
1	https://nptel.ac.in/courses/105103192
2	https://nptel.ac.in/courses/112104117
3	https://egyankosh.ac.in/simple-search?query=Hydraulic+machines+Turbines+and+Pumps+&sort_by=score&order=desc&rpp=10&etal=0&start=0
4	https://egyankosh.ac.in/simple-search?location=%2F&query=Open+Channel+Flow&rpp=10&sort_by=score&order=desc

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

COURSE DESIGN AND DELIVERY SYSTEM (CDD)

- The Course syllabus is written into number of learning objectives and outcomes.
- These learning objectives and outcomes will be achieved through lectures, assessments, assignments, experiments in the laboratory, projects, seminars, presentations, etc.
- Every student will be given an assessment plan, criteria for assessment, scheme of evaluation and grading method.
- The Learning Process will be carried out through assessments of Knowledge, Skills and Attitude by various methods and the students will be given guidance to refer to the text books, reference books, journals, etc.

The faculty be able to –

- Understand the principles of Learning
- Understand the psychology of students
- Develop instructional objectives for a given topic
- Prepare course, unit and lesson plans
- Understand different methods of teaching and learning
- Use appropriate teaching and learning aids
- Plan and deliver lectures effectively
- Provide feedback to students using various methods of Assessments and tools of Evaluation
- Act as a guide, advisor, counselor, facilitator, motivator and not just as a teacher alone

Signature of HOD   Signature of faculty

Date: Date:

Gokaraju Rangaraju Institute of Engineering and Technology
Department of Civil Engineering

COURSE SCHEDULE

Academic Year   : 2021-2022   **Semester** : **II**

Name of the Program: B. Tech Civil Engg.   **Year:** II Year **Section:**

A **Course/Subject**   : Hydraulic Engineering   **Course Code**   :
GR20A2019

Name of the Faculty : Dr. Mohd.Hussain   **Designation:**

Professor

Dept.: Civil Engineering

The Schedule for the whole Course / Subject is:

S. No.	Description	Duration (Date)		Total No. Of Periods
		From	To	
1.	**UNIT I:**	9/03/202	25/03/2022	14
2.	**UNIT II:**	28/03/2022	7/04/2022	10
3.	**UNIT III:**	8/04/2022	29/04/2022	12
4.	**UNIT IV:**	9/05/2022	9/06/2022	19
5.	**UNIT V:**	9/06/2022	24/06/2022	8

1. Total No. of Instructional hours available for the course: **66** Hours

Gokaraju Rangaraju Institute of Engineering and Technology Department of Civil Engineering
SCHEDULE OF INSTRUCTIONS
UNIT PLAN

Academic Year : 2021-2022   **Semester** : **II**

Name of the Program: B. Tech Civil Engg.   **Year:** II Year **Section:**

A **Course/Subject** : Hydraulic Engineering   **Course Code**:

GR20A2019

Name of the Faculty : Dr. Mohd.Hussain   **Designation:**

Professor

Dept.: Civil Engineering   **Unit No: 1**

Lesson No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcomes Nos.	Blooms Taxonomy	References (Text Book of "Flow in open Channels" by K Subramanya) Page Nos.: ____to ____
1	9/03/22	1	Computation of Uniform flow	COB's - 1 CO's - 1	K1	
2	9/03/22 &10/3/22	2	Comparison between open channel flow and pipe flow, geometrical parameters of a channel	COB's - 1 CO's - 1	K5	
3	10/03/22 & 11/3/22	2	Classification of open channels, Classification of open channel flow	COB's - 1 CO's - 1	K3	
4	16/03/22	2	Velocity Distribution of	COB's - 1 CO's - 1	K3	

			channel section. Characteristics of uniform flow			
5	17/03/22	2	Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient 'n'	COB's - 1 CO's - 1	K2	
6	23/03/22	2	Most economical section of channel.	COB's - 1 CO's - 1	K3	
7	24/03/22	2	Specific energy, Specific energy curve	COB's - 1 CO's - 1	K5	
8	25/03/22	1	Critical flow, discharge curve ,Specific force Specific depth, and Critical depth.	COB's - 1 CO's - 1	K3	

Signature of HOD
faculty
Date:

Signature   of

Date:

Gokaraju Rangaraju Institute of Engineering and Technology
Department of Civil Engineering

SCHEDULE OF INSTRUCTIONS
UNIT PLAN

Academic Year   : 2021-2022   **Semester** : **II**

Name of the Program: B. Tech Civil Engg.   **Year:** II Year **Section:**

A **Course/Subject**   : Hydraulic Engineering   **Course Code** :

GR20A2019

Name of the Faculty : Dr. Mohd.Hussain   **Designation:**

Professor

Dept.: Civil Engineering   **Unit No: 2**

Lesson No.	Date	No. of Periods	Topics / Sub – Topics	Objectives & Outcomes Nos.	Blooms Taxonomy	References (Text Book of "Flow in open Channels" by K Subramanya) Page Nos.: ____to ____
1.	28/03/22, 30/03/22	2	Channel Transitions.	COB's –2 CO's - 2	K4	
2.	30/03/22, 31/03/22	2	Measurement of Discharge and Velocity – Venturi Flume, Parshall Flume, Measurement of Velocity- Current meter, Floats, Hotwire.	COB's –2 CO's -2	K3	
3.	31/03/22	2	Gradually Varied Flow- Dynamic Equation of	COB's –2 CO's - 2	K3	

	01/04/22		Gradually Varied Flow,			
4.	6/04/22	2	Classification of channel bottom slopes, Classification of surface profile, Characteristics of surface profile.	COB's –2 CO's - 2	K3	
5.	7/04/22	2	Computation of water surface profile. Direct Step method.	COB's –2 CO's - 2	K3	

Signature of HOD   Signature
of faculty
Date: Date:

Gokaraju Rangaraju Institute of Engineering and Technology
Department of Civil Engineering

SCHEDULE OF INSTRUCTIONS
UNIT PLAN

Academic Year   : 2021-2022   **Semester** : **II**

Name of the Program: B. Tech Civil Engg.   **Year:** II Year **Section:**

A **Course/Subject**   : Hydraulic Engineering   **Course Code** :

GR20A2019

Name of the Faculty : Dr. Mohd.Hussain   **Designation:**

Professor

Dept.: Civil Engineering   **Unit No: 3**

Lesson No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcomes Nos.	Blooms Taxonomy	References (Text Book of "Flow in open Channels" by K Subramanya) Page Nos.: ____to ____
1.	8/04/22, 13/04/22	2	Dimensional homogeneity, Rayleigh method	COB's –3 CO's - 3	K2	
2.	13/04/22, 20/04/22	2	Buckingham's Pi method. Buckingham's πTheorem	COB's –3 CO's - 3	K3	
3.	20/04/22, 21/04/22	2	Application of dimensional analysis and model studies to fluid flow problem Dimensionless groups	COB's –3 CO's - 3	K3	
4.	21/04/22, 22/04/22	2	Similitude, Model studies, Types of models. Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number.	COB's –3 CO's - 3	K3	

5.	27/04/22	2	Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes	COB's –3 CO's - 3	K3	
6.	28/04/22, 29/04/22	2	Jet striking Centrally	COB's –3 CO's - 3	K5	

Signature of HOD   Signature   of
faculty

Date: Date:

Gokaraju Rangaraju Institute of Engineering and Technology Department of Civil Engineering
SCHEDULE OF INSTRUCTIONS
UNIT PLAN

Academic Year : 2021-2022   **Semester** : **II**

Name of the Program: B. Tech Civil Engg.   **Year:** II Year **Section:**

A **Course/Subject** : Hydraulic Engineering   **Course Code** :

GR20A2019

Name of the Faculty : Dr. Mohd.Hussain   **Designation:**

Professor

Dept.: Civil Engineering   **Unit No: 4**

Lesson No.	Date	No. of Periods	Topics / Sub – Topics	Objectives & Outcomes Nos.	Blooms Taxonomy	References (Text Book of "Flow in open Channels" by K Subramanya) Page Nos.: ____to ____
1.	9/05/22	2	Theory of hydraulic jump, Elements and characteristics of hydraulic jump in a rectangular Channel,	COB's - 4 CO's - 4	K2	
2.	12/05/22	1	Length and height of jump, location of jump	COB's - 4 CO's - 4	K3	
3.	12/05/22, 22/05/22	2	Types, applications and location of hydraulic jump.	COB's - 4 CO's - 4	K3	
4.	22/05/22	1	Energy dissipation and other uses	COB's - 4 CO's - 4	K3	
5.	19/05/22	2	Hydraulic Jump surges a moving hydraulic jump	COB's - 4 CO's - 4	K3	
6.	19/05/22, 20/05/22	2	Layout of a typical Hydropower installation Heads and Efficiencies	COB's - 4 CO's - 4	K2	

7.	23/05/22	2	Classification of turbines-pelton wheel, Francis turbine, Kaplan turbine	COB's - 4 CO's - 4	K3	
8.	1/06/22	2	Working, working proportions, velocity diagram, work done and efficiency	COB's - 4 CO's - 4	K3	
9.	2/06/22	2	Draft tube theory and function efficiency.	COB's - 4 CO's - 4	K3	
10	3/06/22, 8/06/22	2	Angular momentum principle, Applications to radial flow turbines.	COB's - 4 CO's - 4	K3	
11	8/06/22, 9/06/22	2	Governing of turbines, characteristic curves.	COB's - 4 CO's - 4	K3	

Signature of HOD   Signature   of
faculty

Date: Date:

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

SCHEDULE OF INSTRUCTIONS
UNIT PLAN

Academic Year : 2021-2022   **Semester** : **II**

Name of the Program: B. Tech Civil Engg.   **Year:** II Year **Section:**

A **Course/Subject** : Hydraulic Engineering   **Course Code** :

GR20A2019

Name of the Faculty : Dr. Mohd.Hussain   **Designation:**

Professor

Dept.: Civil Engineering   **Unit No: 5**

Lesson No.	Date	No. of Periods	Topics / Sub - Topics	Objectives & Outcomes Nos.	Blooms Taxonomy	References (Text Book of "Fl in open Channels" K Subramanya Page Nos.: ____t ____
1.	9/06/22 , 10/06/22	2	Pump installation details- classification-	COB's - 5 CO's - 5	K2	
2.	17/06/22, 22/06/22	2	Work done- Manometric head minimum starting speed losses and efficiencies	COB's - 5 CO's - 5	K3	
3.	22/06/22	1	specific speed multistage pumps-pumps in parallel	COB's - 5 CO's - 5	K4	
4.	23/06/22	1	Performance of pumps characteristic curves- NPSH-Cavitations	COB's - 5 CO's - 5	K2	
5.	23/06/22	1	Reciprocating pumps basics and definition.	COB's - 5 CO's - 5	K2	
6.	24/06/22	1	Classification of Hydropower plants :Load	COB's - 5 CO's - 5	K3	

			factor, capacity factor,estimation of hydropower potential			

Signature of HOD   Signature of faculty

Date: Date:

LESSON PLAN

Academic Year : 2021-22 Date: 9/3/22

Semester : II

Name of the Program : II B.Tech Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL ENGINEERING

Designation: PROFESSOR

Lesson No: …………1…………………………… Duration of Lesson: 2 hr ……………….

Lesson Title: …… Introduction to open channel flows: open channel flows

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be
1. Able to distinguish the open channel flows and Pipe flow
2. Able to describe the open channel flows
3. Ability to explain the open channel flows
4. Able to define open channel flows

TEACHING AIDS : White Board and marker

TEACHING POINTS :

Open channel flows, normal flows, definition

Assignment / Questions: 1. Q.)Explain is the open channel flows? (Cob & Co) cob1,2&co 1,2,7

2Q) A triangulat gutter whose sides include an angl of 60^0 conveys water at uniform depth of 25cm . if the discharge is $0.04m^3$ /s work out the bed slpe of pipe take C=52 (Cob & Co) cob1,2&co 1,2,7

Signature
of faculty

LESSON PLAN

Academic Year   :   2021-22   Date: 10/3/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL ENGINEERING

Designation: PROFESSOR

Lesson No: …………2…………………………… Duration of Lesson: <u>1hr</u> ……………….

Lesson Title: …… Types of flows , Types of channels Velocity distribution

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able to   describe the types of flows

2. Able to interprets the various types of flows

3. Ability to explain the fluids types of flows

4. Able to define types of flows

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

Types of flow uniform, non uniform ,laminar,turbulent,steadt,unsteady,1,2,3 dimensional flows

Assignment / Questions: 1. Q.)Explain is the different types of channel flows (Cob & Co)1,2&1,2,7

              2.Asst.) what is open channel flow discuss? Discuss (Cob & Co)1,2&1,2,7

Signature   of
faculty

..

LESSON PLAN

Academic Year   :   2021-22   Date: 16/3/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………3…………………………… Duration of Lesson: 2hr
……………….

Lesson Title: Momentum correction factors Energy correction factors

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to derive the Momentum correction factors
2. Able to compute the Energy correction factors
3. Ability to explain the Momentum correction factors
4. Able to define Energy correction factors & Velocity Distribution of Channel sections
& Characteristics of Uniform flow

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

Energy correction factors Momentum correction factors Application in the open channel flows Velocity Distribution of Channel sections

Assignment / Questions: 1. Q.) Enumerate function of Momentum correction factors (Cob & Co)1,2&12,7
            2.Asst.) Explain is Energy correction factors? Discuss (Cob & Co)1,2&1,2,7

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 17/3/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN……….Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………4………………………… Duration of Lesson: <u>2hr</u>
……………….

Lesson Title: …… Chezy's, Manning's equations

<u>INSTRUCTIONAL/LESSON OBJECTIVES</u>:

On completion of this lesson the student shall be :
1. Able to write the Chezy's, equations
2. Able to understand the Manning's equations
3. Able to solve the Manning's equations and chezy equation

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

Chezy's, equatins uses in the open channel flows, Manning's equatins in the open channel flows Relation between the Manning and chezy equations

Assignment / Questions: 1. Q.)Explain is the Chezy's, Manning's equations and obtain the relation
2.Asst.) aA rectangular channel of width is having a bed slope 1 in 1500 find the maximum discharge through the channel. C=50 (Cob & Co)1,2&1,2,7

Signature of faculty

LESSON PLAN

Academic Year : 2021-22 Date: 23/3/22

Semester : II

Name of the Program : II B.Tech Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………5………………………… Duration of Lesson: <u>1hr</u>
……………….

Lesson Title: …… Bazin's Formulae for Uniform flow

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able to derive the most economical rectangular and trapezoidal sections

TEACHING AIDS : White Board and marker

TEACHING POINTS :

Most Economical rectangular and trapezoidal sections

Assignment / Questions: 1. Q.)Explain the derivation of most economical rectangular and trapezoidal sections ?(Cob & Co)1,2&12,7
2.Asst.) explain is relation between the Manning's and Chezys formulae.? Discuss (Cob & Co)1,2&1,2,7
3.claculate the flow rat and conveyance for rectangle for rectangle channel 5m wide for uniform flow at a depth of 1.5m. th depth of slope is vertical to 1000hrizonatl .also c=50 find type of flow.

Signature of faculty

LESSON PLAN

Academic Year   :   2021-22   Date: 23/3/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL ENGINEERING

Designation: PROFESSOR

Lesson No: …………6………………………… Duration of Lesson: 1hr ……………….

Lesson Title: …… Most economical sections, Introduction to critical flow Critical flow:

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the Most economical sections circular section

2. Ability to explain the Most economical sections triangular section

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

Most economical sections circular section Most economical sections triangular

Assignment / Questions: 1. Q.)Explain is the Most economical sections circular section and   derive its values (Cob & Co)1,2&12,7
 2.Asst.) Discuss Most economical sections of rectangular and obtain the relation between the width and depth (Cob & Co)1,2&1,2,7

Signature of faculty

LESSON PLAN

Academic Year : 2021-22 Date:24/3/22

Semester : II

Name of the Program : II B.Tech Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL ENGINEERING

Designation: PROFESSOR

Lesson No: …………7…………………………… Duration of Lesson: 1hr ……………….

Lesson Title: …… Specific energy depth , Critical depth & computations

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the Specific energy
2. Able to identify the Specific energy depth
3. Ability to explain the Specific energy, Critical depth
4. Able to solve problem on Specific energy, Critical depth

TEACHING AIDS : White Board and marker

TEACHING POINTS :

Specific e energy Specific e energy depth Specific e energy Critical depth solve problem on Specific e energy

Assignment / Questions: 1. Q.)Explain is the Specific e energy and draw. 1,2&12,7
2.Asst.) The discharge of water through a rectangular channel of width 8m is 15m³/s when the depth of water is 1.2m calculate sp.energy. (Cob & Co)1,2&1,2,7

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 24/3/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL ENGINEERING

Designation: PROFESSOR

Lesson No: …………8…………………………… Duration of Lesson: <u>1hr</u> ……………….

Lesson Title: …… Specific e energy problem solving

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :

1   Able to solve problem on problems Specific e energy Critical depth,

TEACHING AIDS   :   White Board and marker

TEACHING POINTS   :

Specific e energy problem solving   Specific e energy depth problem solving   Specific e energy Critical depth problem solving   solve problem on Specific e energy problem solving

Assignment / Questions: 1. Q.) The discharge of water through a rectangular channel of width 8m is $15 m^3/s$ when the depth of water is 1.2m calculate   sp.energy., critical depth, min.specific energy (Cob & Co)1,2&1,2,7

Signature of faculty

LESSON PLAN

Academic Year   :   2021-22   Date: 25/3/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………9………………………… Duration of Lesson: 1hr
……………….

Lesson Title: …… Critical, Sub-Critical, Super Critical flows

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the Critical, Sub-Critical, Super Critical flows
2. Able to understand the Critical, Sub-Critical, Super Critical flows
3. Ability to explain the Critical, Sub-Critical, Super Critical flows
4. Able to solve problem on Critial, Sub-Critical, Super Critical flows

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

Critial, Sub-Critical, Super Critical flows

Assignment / Questions: 1. Q.)Explain is the Critical, Sub-Critical, Super Critical flows?
(Cob & Co)1,2&12,7

2Q) Q.) The discharge of water through a rectangular channel of width 9m is 20m³/s
when the depth of water is 1.5m calculate   sp.energy., critical depth, min.specific
energy (Cob & Co)1,2&1,2,7

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 25/3/2022

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………10…………………………… Duration of Lesson: 1hr
……………….

Lesson Title: …… Various types of problems covering all methods, problem solving

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Problems of different types covering all methods.

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

Various types of problems covering all methods, problem solving

Assignment / Questions: 1. Q.)Previous papers problem(Cob & Co) 1,2&12,7

                                                                          Signature

of faculty

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 28/3/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………11…………………………… Duration of Lesson: 1hr …

Lesson Title: …… Introduction to OPEN CHANNEL FLOWS-II: Non-Uniform flow

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Explain channel transitions

TEACHING AIDS   :   White Board and marker

TEACHING POINTS   :

open channel flows in non-uniform flow

Assignment / Questions: 1. Q.)Explain is the Non-Uniform flow 1,2&1,2,7(Cob & Co)
2.Asst.) Explain is differentiate uniform and non uniform flow and Discuss (Cob & Co)1,2&1,2,7

Signature of faculty

LESSON PLAN

Academic Year : 2021-22 Date:30/3/22

Semester : II

Name of the Program : II B.Tech Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL ENGINEERING

Designation: PROFESSOR

Lesson No: …………12…………………………… Duration of Lesson: 2hr ……………….

Lesson Title: …… Dynamic equation for G.V.F

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to derive the Dynamic equation for G.V.F
2. Able to solve problems on Dynamic equation for G.V.F
3. Ability to explain the Dynamic equation for G.V.F
4. Able to define Dynamic equation for G.V.F

TEACHING AIDS : White Board and marker

TEACHING POINTS :

Dynamic equation for G.V.F derivation

Assignment / Questions: 1. Q.)Explain is the Dynamic equation for G.V.F (Cob & Co)1,2&12

 2.Asst.) The sp.energy for a 3m wide channel is to be 3kg-m/kg. what would Be the maximum possible discharge.? Discuss (Cob & Co)1,2&1,2

S

ignature of faculty

LESSON PLAN

<u>A</u>cademic <u>Y</u>ear   :   2021-22   Date: 31/3/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………13…………………………… Duration of Lesson: <u>1hr</u>
……………….

Lesson Title: …… Mild. Critical, steep, horizontal, And adverse slopes, Surface profiles

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able to draw the Mild. Critical, steep, horizontal, And adverse slopes, Surface profiles
2. Able to predict the Mild. Critical, steep, horizontal, And adverse slopes, Surface profiles
3. Ability to explain the Mild. Critical, steep, horizontal, And adverse slopes, Surface profiles
4. Able to solve problem on Mild. Critical, steep, horizontal, And adverse slopes, Surface profiles
5. Able to measure discharge and Velocity using Venturiflume , Parshall flume , Current meter, Floats and Hot wire

TEACHING AIDS   :   White Board and marker

TEACHING POINTS   :

Mild. Critical, steep, horizontal, And adverse slopes, Surface profiles

Assignment / Questions: 1. Q.)Explain is the Mild. Critical, steep, slopes, Surface profiles (Cob & Co)1,2&12,7
2.Asst.) explain is horizontal, And adverse slopes, Surface profiles and Discuss (Cob & Co) 1,2&1,2,7

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 1/4/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL ENGINEERING

Designation: PROFESSOR

Lesson No: …………14…………………………… Duration of Lesson: 1hr ……………….

Lesson Title: …… Direct step method & problem solving

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able to describe the Direct step method
2. Able to understand the Direct step method
3. Ability to explain the Direct step method
4. Able to solve problem on Direct step method

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

> Direct step method, backwater curve ,derivation, procedure,different expressions

Assignment / Questions: 1. Q.)Explain is the Direct step method (Cob & Co)1,2&12,7
2.Asst.) Determine the length of back water curve caused by an afflux os 2m in a rectangular channel of width 40m and depth 2.5m . the slope of the bed is givn as 1 in 11000 n=0.03 (Cob & Co)1,2&1,2,7

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 6/4/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………15………………………… Duration of Lesson: 1hr
……………….

Lesson Title: …… Rapidly varied flow,

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to list of the Rapidly varied flow
2. Able to draw the Rapidly varied flow profiles
3. Ability to explain the Rapidly varied flow
4. Able to solve problem on Rapidly varied flow

TEACHING AIDS   :   White Board and marker

TEACHING POINTS   :

rapidly varied flow definition Explanation,sketches, Rapidly varied flow

Assignment / Questions: 1. Q.)Explain is the Rapidly varied flow (Cob & Co)1,2&12,7

     2.Asst.) How rapidly varied flow is different form G.V.F? Discuss (Cob & Co) 2,3& 1,2

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 9/5/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………16……………………… Duration of Lesson: 1hr
……………….

Lesson Title: …… Hydraulic jump.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the Hydraulic jump length
2. Able to understand the Hydraulic jump height
3. Ability to explain the Hydraulic jump alternative depth
4. Able to solve problem on Hydraulic jump

TEACHING AIDS   :   White Board and marker

TEACHING POINTS   :

> Hydraulic jump length , Hydraulic jump alternative depth, Hydraulic jump alternative depth problem on Hydraulic jump

Assignment / Questions: 1. Q.)explain is the determine the length of back water curve caused by an afflux os 2m in a rectangular channel of width 40m and depth 2.5m . the slope of the bed is givn as 1 in 11000 n=0.03 (Cob & Co)1,2&1,2,7?

2.Asst.) describe the hydraulic jump and obtain the relation of jump. (Cob & Co)2,3& 1,2

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 18/5/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL
ENGINEERING

Designation: PROFESSOR

Lesson No: …………17……………………… Duration of Lesson: 1hr
……………….

Lesson Title: …… Energy dissipation ,Problems on slope profiles

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able to write the Energy dissipation
2. Able to describe the Energy dissipation
3. Ability to explain the Energy dissipation
4. Able to solve problem on Problems on slope profiles

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

Problems on slope profiles Energy dissipation

Assignment / Questions: 1. Q.)explain is the Energy dissipation (Cob & Co) 2,3& 1,2
2.Asst.) explain is slope profile draw different types of profiles and Discuss (Cob &
Co)2,3& 1,2

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 7/4/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL
ENGINEERING

Designation: PROFESSOR

Lesson No: …………22………………………… Duration of Lesson: 1hr
……………….

Lesson Title: …… Problems on slope profiles

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
2. Able to illustrate the Problems on slope profiles

3. Ability to explain the Problems on slope profiles

4. Able to solve problem on slope profiles

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

Able to solve problem on slope profiles Mildslope horizontal slope

Assignment / Questions: 1. Q.)explain is the slope profiles? Explain with the neate
sketch (Cob & Co)2,3& 1,2
                2.Asst.) what is different types of channel slopes ? Discuss (Cob & Co)
2,3& 1,2

ignature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 8/4 & 13/4

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………19………………………… Duration of Lesson: 2hr ……

Lesson Title: …… Introduction to HYDRULICSIMILITUDE: Dimensional analysis-
Rayleigh's method
INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to describe the hydraulic similitude:
2. Able to understand the   Dimensional analysis
3. Ability to explain the Rayleigh's method
4. Able to solve problem on Rayleigh's method

TEACHING AIDS   :   White Board and marker

TEACHING POINTS   :

Hydraulic similitude, the   Dimensional analysis Rayleigh's method

Assignment / Questions: 1. Q.)what is the Rayleigh's method? Derive the expression
(Cob & Co)1,2&12,7
2.Asst.) write different types of units and dimensions ? Discuss (Cob &
Co)1,2&1,2,7

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 13/4, 20/4

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL ENGINEERING

Designation: PROFESSOR

Lesson No: …………20………………………… Duration of Lesson: <u>2hr</u> ……………….

Lesson Title: …… Buckingham's PI theorem,

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able to write the Buckingham's PI theorem
2. Able to understand the Buckingham's PI theorem
3. Ability to explain the Buckingham's PI theorem
4. Able to solve problem on Buckingham's PI theorem

TEACHING AIDS   :   White Board and marker

TEACHING POINTS   :

Buckingham's PI theorem derivation a and problems

Assignment / Questions: 1. Q.)Write Buckingham's PI theorem with derivation (Cob & Co)3,4&4,6,7
2.Asst.) The efficiency of fan n depends on the density e viscosity μ of the fluid angular velocity w diameter D of rotor and discharge q express n in terms of dimension less parameters (Cob & Co)3,4&4,6,7

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 20/4/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL
ENGINEERING

Designation: PROFESSOR

Lesson No: …………21………………………… Duration of Lesson: 2 hr
……………….

Lesson Title: …… Hydraulic models,

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to describe the hydraulic models
2. Able to understand the hydraulic models
3. Ability to explain the hydraulic models
4. Able to solve problem on hydraulic models

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

hydraulic models ,proto type, distorted model

Assignment / Questions: 1. Q.)Distinguish about hydraulic models (Cob & Co)
3,4&4,6,7
              2.Asst.) what is, distorted model and distorted model ? Discuss (Cob &
Co)3,4&4,6,7

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 21/4/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL ENGINEERING

Designation: PROFESSOR

Lesson No: ………….22……………………… Duration of Lesson: 1hr

Lesson Title: …… Geometric, Kinematic, Dynamic similarities & problems

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the
2. Able to understand the
3. Ability to explain the
4. Able to solve problem on

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

Geometric, Kinematic similarities
Dynamic similarities

Assignment / Questions: 1. Q.)differentiate Geometric, Kinematic similarities? (Cob & Co)3,4&4,6,7
            2.Asst.) what is Dynamic similarities? Discuss (Cob & Co)3,4&4,6,7

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

<u>A</u>cademic <u>Y</u>ear   :   2021-22   Date: 21/4/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………23………………………… Duration of Lesson: <u>1hr</u> …
Lesson Title: …… Geometric, Kinematic, Dynamic similarities, Dimension less Numbers-model

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able to write the Geometric similarities
2. Able to understand the Kinematic similarities
3. Ability to explain the Dynamic similarities
4. Able to solve problem on Geometric, Kinematic, Dynamic similarities

TEACHING AIDS   : White Board and marker
TEACHING POINTS   :

Dynamic similarities, Geometric, Kinematic, Dynamic similarities problems

Questions: 1. Q.)what is the Geometric, Kinematic, Dynamic similarities? (Cob & Co)3,4&4,6,7

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 22/4/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………24………………………… Duration of Lesson: 1hr
……………….

Lesson Title: …… Dimension less Numbers-model,

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the Dimension less Numbers-model
2. Able to understand the Dimension less Numbers-model
3. Ability to explain the Dimension less Numbers-model
4. Able to solve problem on Dimension less Numbers-model

TEACHING AIDS   :   White Board and marker

TEACHING POINTS   :

Dimension less Numbers-model
Geometric, Kinematic, Dynamic similarities

Assignment / Questions: 1. Q.)Explain is the Dimension less Numbers (Cob & Co)
3,4&4,6,7

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   : 2021-22   Date: 22/4/22

Semester   : II

Name of the Program : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………25………………………… Duration of Lesson: 1hr
……………….

Lesson Title: …… Model and prototype relations, various types of problems

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able to write the   Model and prototype relations
2. Able to understand the Model and prototype relations
3. Ability to explain the Model and prototype relations
4. Able to solve problem on Model and prototype relations

TEACHING AIDS   : White Board and marker
TEACHING POINTS :

Model and prototype relations Geometric, Kinematic, Dynamic similarities

Questions: 1. Q.)what is the Geometric, Kinematic, Dynamic similarities ? (Cob & Co)3,4&4,6,7

   2.Asst.) explain is Model and prototype relations and Discuss (Cob & Co)3,4&4,6,7

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic **Y**ear : 2021-22 Date: 27/4/22

Semester : II

Name of the Program : II B.Tech Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………26………………………… Duration of Lesson: 1hr
……………….

Lesson Title: …… Hydrodynamic Force of jets on Stationery and moving flat plate

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the   Hydrodynamic Force of jets on Stationery and moving flat plate
2. Able to understand the Hydrodynamic Force of jets on Stationery and moving flat
plate
3. Ability to explain the Hydrodynamic Force of jets on Stationery and moving flat plate
4. Able to solve problem on Hydrodynamic Force of jets on Stationery and moving flat
plate

TEACHING AIDS   : White Board and marker
TEACHING POINTS   :

Hydrodynamic Force of jets on Stationery and moving flat plate
work done ,efficiency ,power developed by jet

Assignment / Questions: 1. Q.)what is the Hydrodynamic Force of jets on Stationery and
moving flat plate
? 3,4&4,6,7
2.Asst.) jet water strike s the flat plate by the jet diameter 75mm with velocity fo
20m/s find force exerted by jet . (Cob & Co)3,4&4,6,7

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22 Date: 27/4/22

Semester : II

Name of the Program : II B.Tech Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Designation: PROFESSOR

Lesson No: …………27……………………… Duration of Lesson: <u>1hr</u>
Lesson Title: …… Hydrodynamic Force of jets on Stationery and moving inclined plate

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able to write the Hydrodynamic Force of jets on Stationery and moving inclined plate
2. Able to understand the Hydrodynamic Force of jets on Stationery and moving inclined plate
3. Ability to explain the Hydrodynamic Force of jets on Stationery and moving inclined plate
4. Able to solve problem on Hydrodynamic Force of jets on Stationery and moving inclined plate

TEACHING AIDS : White Board and marker
TEACHING POINTS :

Hydrodynamic Force of jets on Stationery and moving inclined plate

Assignment / Questions: 1. Q.)What is the Hydrodynamic Force of jets on Stationery and moving inclined plate? 3,4&4,6,7
2.Asst.) Plate making an angle of 30^{0} find work done and power by the jet. (Cob & Co)3,4&4,6,7

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   : 2021-22   Date: 28/4/22

Semester   : II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………28………………………… Duration of Lesson: 1hr ……

Lesson Title: …… Hydrodynamic Force of jets on Stationery and moving curved plate

INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be :
1. Able to write the Hydrodynamic Force of jets on Stationery and moving curved plate
2. Able to understand the Hydrodynamic Force of jets on Stationery and moving curved plate
3. Ability to explain the Hydrodynamic Force of jets on Stationery and moving curved plate
4. Able to solve problem on Hydrodynamic Force of jets on Stationery and moving curved plate
TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

Hydrodynamic Force of jets on Stationery and moving curved plate

Assignment / Questions: 1. Q.)Explain is the Hydrodynamic Force of jets on Stationery and moving curved plate? 3,4&4,6,7
2.Asst.) Jet water strikes with diameter of 50mm. on the curved plate with velocity 40m/s find force exrted by jet in the direction of jet (Cob & Co)3,4&4,6,7

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 29/4/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING Designation: PROFESSOR

Lesson No: …………29………………………… Duration of Lesson: <u>1hr</u>
Lesson Title: …… Jet striking centrally and at tip Expression for work done and efficiency
<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able to write the Jet striking centrally and at tip Expression for work done and efficiency
2. Able to understand the Jet striking centrally and at tip Expression for work done and efficiency
3. Ability to explain the Jet striking centrally and at tip Expression for work done and efficiency
4. Able to solve problem on Jet striking centrally and at tip Expression for work done and efficiency
TEACHING AIDS   : White Board and marker
TEACHING POINTS   :

> Jet striking centrally and at tip Expression for work done and efficiency

Assignment / Questions: 1. Q.)Explain is the Jet striking centrally and at tip Expression for work done and efficiency 3,4&4,6,7
2Q. derive expression of the jet strikes the unsymmetrical curved vane (Cob & Co) 3,4&4,6,7

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 29/4/22

Semester   : II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL ENGINEERING

Designation: PROFESSOR

Lesson No: …………30………………………… Duration of Lesson: <u>1hr</u> ……………….

Lesson Title: Velocity triangles at inlet and outlet

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able to write the Velocity triangles at inlet and outlet
2. Able to understand the Velocity triangles at inlet and outlet
3. Ability to explain the Velocity triangles at inlet and outlet
4. Able to solve problem on Velocity triangles at inlet and outlet

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

> Velocity triangles at inlet and outlet
> Curved plate, momentum principle
> Workdone, efficincy

Assignment / Questions: 1. Q.)Explain is the Velocity triangles at inlet and outlet and Discuss (Cob & Co)3,4&4,6,7

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic **Y**ear   :   2021-22   Date: 3 /6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………31………………………… Duration of Lesson: <u>1hr</u>
……………….

Lesson Title: …… Angular momentum principle

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able to write the angular momentum principle
2. Able to understand the angular momentum principle
3. Ability to explain the angular momentum principle
4. Able to solve problem on angular momentum principle

TEACHING AIDS   : White Board and marker
TEACHING POINTS   :

angular momentum principle Velocity triangles at inlet and outlet Curved plate, momentum principle Workdone, efficincy

Assignment / Questions: 1. Q.)explain is the angular momentum principle? (Cob & Co)
3,4&4,6,7

                 2.Asst.) what is angular momentum principle? Discuss (Cob &
Co)3,4&4,6,7

**Gokaraju Rangaraju Institute of Engineering and
Technology (Autonomous)**
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

<u>A</u>cademic <u>Y</u>ear   :   2021-22   Date: 8 /6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………32………………………… Duration of Lesson: <u>1hr</u>
……………….

Lesson Title: …… momentum principle applications to radial flow Turbine

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able to write the momentum principle applications to radial flow Turbine
2. Able to understand the applications to radial flow Turbine
3. Able to solve problem on applications to radial flow Turbine

TEACHING AIDS   :   White Board and marker

TEACHING POINTS   :

applications to radial flow Turbine definition and derivation and problems
pipe bend . forces in different dirction

Assignment / Questions: 1. Q.)Explain the applications to radial flow Turbine (Cob &
Co) 3,4&4,67

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 1/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………33……………………… Duration of Lesson: 1hr
……………….

Lesson Title: …… Introduction to HYDRAULIC TURBINES-I; layout of typical hydropower installations, classification of turbines, Pelton Wheel

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the to hydraulic turbines
2. Able to understand the layout of typical hydropower installations
3. Ability to explain the layout of typical hydropower installations

TEACHING AIDS   : White Board and marker
TEACHING POINTS   :

> Classification of Hydroturbine
> Head , net head, gross head, efficiencies, mechanical efficiency, hydrolic efficiency, overall efficiecncies
>
> layout of typical hydropower installations

Assignment / Questions: 1. Q.)Write types of efficiencies (Cob & Co)3,4&4,67
2q.) Draw hydropower layout and neat sketch (Cob & Co)3,4&4,67

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 1/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………34………………………… Duration of Lesson: 1hr
……………….

Lesson Title: Francis Turbine, Kaplan turbine working, working proportions, velocity diagrams, work done and efficiency

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the Francis Turbine working proportions, velocity diagrams, work done and efficiency
2. Able to understand the Francis Turbine
3. Ability to explain the Kaplan turbine working
4. Able to solve problem working proportions, velocity diagrams, work done and efficiency

TEACHING AIDS   :   White Board and marker

TEACHING POINTS   :

Francis Turbine , Francis Turbine ,working proportions, velocity diagrams, work done and efficiency
Design Francis Turbine, Kaplan turbine

Assignment / Questions: 1. Q.)Write design procedure of pelton wheel turbine ?
(Cob & Co)3,4&4,67
        2.Asst.) Write design procedure of Kaplan turbine (Cob & Co)3,4&4,67

LESSON PLAN

Academic Year   :   2021-22   Date: 8/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………35………………………… Duration of Lesson: 1hr
……………….

Lesson Title: Hydraulic design theory and problems

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the Hydraulic design theory
2. Able to explain the Hydraulic design theory and problems

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

Hydraulic design theory ,problems different models

Assignment / Questions: 1. Q.)Explain is the Hydraulic design theory (Cob & Co)
3,4&4,67

Signat

ure of faculty

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22 Date: 2/6/22

Semester : II

Name of the Program : II B.Tech Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL ENGINEERING

Designation: PROFESSOR

Lesson No: …………36………………………… Duration of Lesson: 1hr ……………….

Lesson Title: Drafttube theory, work done and efficiency

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the Drafttube theory,
2. Able to understand the Drafttube theory, work done
3. Ability to explain the Drafttube work done and efficiency
4. Able to solve problem on Drafttube theory, work done and efficiency

TEACHING AIDS : White Board and marker

TEACHING POINTS :

Drafttube theory, work done and efficiency

Assignment / Questions: 1. Q.)explain is the Draft tube draw neat sketch and find its work done and efficiency ? (Cob & Co)3,4&4,67
2.Asst.) Application Draft tube and its work done and efficiency (Cob & Co)3,4&4,67

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 2/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………37………………………… Duration of Lesson: 1hr
……………….

Lesson Title: Drafttube theory, functions

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the type of draft tube
2. Able to understand the draft tube

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

Draft tube theory, work done and efficiency derivation ,Thomas number

Assignment / Questions: 1. Q.)Explain is the work done and efficiency by Draft tube?
(Cob & Co)3,4&4,67
2.Asst.) A water turbine has a velocity of 6m/s at the entrance to the draft tube and a
velocity of 1.2m/s at the exit. For friction losses of 0.1m and a tail water 5m below
the nentrance to the draft tube ,find head at the entrance. (Cob & Co)3,4&4,67

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 2/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………38………………………… Duration of Lesson: <u>1hr</u>
……………….

Lesson Title: Drafttube theory, efficiency problems

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
TEACHING AIDS   :   White Board and marker

TEACHING POINTS   :

Draft tube theory, work done and efficiency problems

Assignment / Questions: 1. Q.)What is the work done and efficiency by Draft tube?
(Cob & Co)3,4&4,67
2.Asst.) A water turbine has a velocity of 6m/s at the entrance to the draft tube and a
velocity of 1.2m/s at the exit. For friction losses of 0.1m and a tail water 5m below
the nentrance to the draft tube ,find head at the entrance. (Cob & Co) 3,4&4,67

LESSON PLAN

Academic Year   :   2021-22   Date: .8/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL ENGINEERING

Designation: PROFESSOR

Lesson No: …………39………………………… Duration of Lesson: <u>1hr</u> ……………….

Lesson Title: Introduction to HYDRAULIC TURBINES-II

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able to write the Governing of Turbines
2. Able to understand the Governing of Turbines
3. Ability to explain the Governing of Turbines

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

Governing of Turbines pelton wheel turbine

Assignment / Questions: 1. Q.)write Governing of Turbines pelton wheel tubine ? (Cob & Co) 3,4&4,67

Sign

ature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 8/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL
ENGINEERING

Designation: PROFESSOR

Lesson No: …………40……………………… Duration of Lesson: 1hr ……

Lesson Title: Governing of Turbines surge tanks – Unit and specific turbines

INSTRUCTIONAL/LESSON OBJECTIVES:
On completion of this lesson the student shall be :
1. Able to write the Governing of Turbines surge tanks
2. Able to understand the Unit and specific turbines
3. Ability to explain the surge tanks
4. Able to solve problem on Unit and specific turbines

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

surge tanks, Unit quantities ,unit discharge quantities, power ,head quntities

Assignment / Questions: 1. Q.)explain the surge tanks? (Cob & Co) 3,4&4,67
2.Asst.) what is unit discharge quantities, power ,head quantities ? Discuss (Cob &
Co)3,4&4,67

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   : 2021-22   Date: 9/6/22

Semester   : II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………41………………………… Duration of Lesson: 1hr
Lesson Title: Unit quantity, Unit power problems

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the Unit quantity
2. Able to understand the Unit speed
3. Ability to explain the Unit power
4. Able to solve problem on Unit head

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

Unit speed
Unit quantity Unit head
Unit power

Assignment / Questions: 1. Q.)turbine develops 9000kw when trunnning at 10rpm .
the head on the turbine Is 30m . if the head on th turbine is reduced to 22m.
determine the sped and power developed by the Turbine. (Cob & Co)3,4&4,67
 2.Asst.) turbine develops 10000kw when trunnning at 20rpm . the head on the
turbine Is 40m . if the head on th turbine is reduced to 22m. determine the sped and
power developed by the Turbine.
(Cob & Co)3,4&4,67

S

ignature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22 Date: 9/6/22

Semester : II

Name of the Program : II B.Tech Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL ENGINEERING

Designation: PROFESSOR

Lesson No: …………42………………………… Duration of Lesson: 1hr ……………….

Lesson Title: Specific speed performance characteristics curves of turbine

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the Specific speed
2. Able to understand the performance characteristics curves of turbine
3. Ability to explain the Specific speed performance characteristics curves turbine
4. Able to solve problem on Specific speed performance characteristics curves

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

Specific speed turbine
characteristics curves of turbine

Assignment / Questions: 1. Q.)what is the Specific speed turbine (Cob & Co)3,4&4,67
             2.Asst.) write characteristics curves of turbine ? Discuss (Cob & Co)3,4&4,67

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 23/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………43………………………… Duration of Lesson: <u>1hr</u>

Lesson Title: Geometric similarity cavitation, various types of problems covering all methods, problem solving

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able to write the Geometric similarity
2. Able to understand the Geometric similarity cavitation
3. Ability to explain the Geometric similarity
4. Able to solve problem on Geometric similarity

TEACHING AIDS   :   White Board and marker

TEACHING POINTS   :

Geometric similarity cavitation ,definition ,concept in the turbine.

Assignment / Questions: 1. Q.)Define cavitations .? explain how it is impact the turbines. (Cob & Co)1,2&12,7

ignature of faculty

**Gokaraju Rangaraju Institute of Engineering and
Technology (Autonomous)**
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 9/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………44………………………… Duration of Lesson: 1hr
……………….

INSTRUCTIONAL/LESSON OBJECTIVES:

Lesson : Geometric similarity ,Cavitations problems
On completion of this lesson the student shall be :
1. Able to write the Governing of Turbines
2. Able to understand the Governing of Turbines
3. Ability to explain the Governing of Turbines

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

Governing of Turbines pelton wheel turbine

Assignment / Questions: 1. Q.)write Governing of Turbines pelton wheel turbine ? (Cob
& Co)3,4&4,67
Assignment / Questions: 2. Q.)what is the work done and efficiency by Draft tube
3,4&4,67
3.Asst.) A water turbine has a velocity of 6m/s at the entrance to the draft tube and a
velocity of 1.2m/s at the exit. For friction losses of 0.1m and a tail water 5m below
the nentrance to the draft tube ,find head at the entrance. (Cob & Co)3,4&4,67

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 8/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………45………………………… Duration of Lesson: 1hr
……………….

Lesson Title: Governing of Turbines surge tanks – Unit and specific turbines

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the Governing of Turbines surge tanks
2. Able to understand the Unit and specific turbines
3. Ability to explain the surge tanks
4. Able to solve problem on Unit and specific turbines

TEACHING AIDS   :   White Board and marker

TEACHING POINTS   :

surge tanks, Unit quantities ,unit discharge quantities, power ,head quntities

Assignment / Questions: 1. Q.)explain the surge tanks? (Cob & Co) 3,4&4,67
2.Asst.) what is unit discharge quantities, power ,head quantities ? Discuss (Cob & Co)3,4&4,67

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 9/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………46……………………… Duration of Lesson: 1hr ………
Lesson Title: problems covering all methods,

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the Francis Turbine working proportions, velocity diagrams, work done and efficiency
2. Able to understand the Francis Turbine
3. Ability to explain the Kaplan turbine working
4. Able to solve problem working proportions, velocity diagrams, work done and efficiency

TEACHING AIDS   :   White Board and marker

TEACHING POINTS   :

Francis Turbine , Francis Turbine ,working proportions, velocity diagrams, work done and efficiency
Design Francis Turbine, Kaplan turbine

Assignment / Questions: 1. Q.)write design proce ure of pelton wheel turbine ?
3,4&4,67   2.Asst.) write design proce ure of Kaplan turbine (Cob &
Co)3,4&4,67

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 9/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………47……… Duration of Lesson: 1hr ……………….
Lesson Title: Introduction to centrifugal pumps: Pumps installation details

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the centrifugal pumps details
2. Able to understand the centrifugal pumps installation
3. Ability to explain the centrifugal pumps

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

centrifugal pumps installation ,heads, different types, efficiencies details

Assignment / Questions: 1. Q.)write about the installation of the centrifugal pump.?
(Cob & Co)4,5&3,5,6
2q.) explain is type of heads and efficiencies exist in the pump. (Cob & Co) 4,5&3,5,6

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic **Y**ear   :   2021-22   Date:10/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………48……………………… Duration of Lesson: <u>1hr</u> ……

Lesson Title: Minimum starting speed ,Classification, work done , monomeric head of centrifugal pump

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able to write the Classification centrifugal pump
2. Able to understand the centrifugal pump
3. Ability to explain the work done centrifugal pump
4. Able to solve problem on manometric head , work done centrifugal pump

TEACHING AIDS   :   White Board and marker

TEACHING POINTS   :

Classification centrifugal pump work done centrifugal pump manometric head , work done centrifugal pump Minimum starting speed

Assignment / Questions: 1. Q.)what is the manometric head , work done centrifugal pump? (Cob & Co)3,4&4,67

 2.Asst.) The diameter of the impeller of a centrifugal pump at inlet and out let 30cm and 60cm respectivly .determine the mini. Specific speed of pump and heads 30m (Cob & Co)4,5&3,5,6

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   : 2021-22   Date:17/6/22

Semester   : II

Name of the Program : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………49………………………… Duration of Lesson: <u>1hr</u> …
Lesson Title: Minimum starting speed – losses and efficiencies

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able to write the Minimum starting speed derivation
2. Able to understand the Minimum starting speed
3. Ability to explain the derivation of Minimum starting speed
4. Able to solve problem on Minimum starting speed

TEACHING AIDS   : White Board and marker

TEACHING POINTS :

Minimum starting speed
Speed and minimum suction head

Assignment / Questions: 1. Q.) The diameter of the impeller of a centrifugal pump at inlet and out let 60cm and 80cm respectively .determine the mini. Specific speed of pump if head is 70m. (Cob & Co)4,5&3,5,6

2Q) How it useful in design the minimum starting speed of pump (Cob & Co)4,5&3,5,6

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 22/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………50………………………… Duration of Lesson: 1hr …
Lesson Title: Various types of problems covering all methods

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the losses of pumps
2. Able to understand the efficiencies of pumps
3. Ability to explain the efficiencies centrifugal pumps
4. Able to solve problem on losses and efficiencies

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

losses and efficiencies centrifugal pumps

Assignment / Questions: 1. Q.)explain the losses and efficiencies centrifugal pumps
(Cob & Co) 4,5&3,5,6
2.Asst.) A centrifugal pump has inlet and out let radious 80mm and 160mm width of
impeller width at inlet is 50mm and at out let is 50mm B1 and B2 is 0.45 and .25
radians. And speed 90rpm determine discharge and head developed by pump. (Cob
& Co)4,5&3,5,6

Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic **Y**ear   :   2021-22   Date: 22/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………51……………………… Duration of Lesson: <u>1hr</u>
……………….

Lesson Title: Specific speed of pump, multistage pumps, pumps in parallel problems

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able to write the Specific speed of pump
2. Able to understand the multistage pumps
3. Ability to explain the pumps in parallel problems
4. Able to solve problem on pumps in parallel problems

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

pumps in parallel problems Specific speed of pump, multistage pumps

Assignment / Questions:1Q) explain the losses and efficiencies centrifugal pumps (Cob & Co)4,5&3,5,6
2Q.Asst.) A centrifugal pump has inlet and out let radious90 and 220mm width of impeller width at inlet is 50mm and at out let is 50mm B1 and B2 is 0.45 and .25 radians. And speed 90rpm determine discharge and head developed by pump. (Cob & Co)4,5&3,5,6

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 23/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………52………………………… Duration of Lesson: 1hr …

Lesson Title: **Performance of centrifugal pumps**,

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the Performance of centrifugal pumps,
2. Able to compute   centrifugal pumps workdone and efficiency
3. Ability to explain the Performance of centrifugal pumps,
4. Able to solve problem centrifugal pumps,

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

Performance of centrifugal pumps,

Assignment / Questions: 1. Q.)explain the Performance of centrifugal pumps,? (Cob & Co)4,5&3,5,6
2.Asst.) A centrifugal pump has inlet and out let radious90 and 220mm width of impeller width at inlet is 50mm and at out let is 50mm B1 and B2 is 0.45 and .25 radians. And speed 90rpm determine discharge and head developed by pump. (Cob & Co)4,5&3,5,6

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 23/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL ENGINEERING

Designation: PROFESSOR

Lesson No: …………53………………………… Duration of Lesson: 1hr ……………….

Lesson Title: **…… characteristic curves of centrifugal pump.**

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the characteristic curves of centrifugal pump
2. Able to understand the characteristic curves of centrifugal pump
3. Ability to explain the characteristic curves of centrifugal pump

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

---

characteristic curves of centrifugal pump
type of characteristic curves of centrifugal pump
constant head, constant speed , iso efficiencies curves.

Assignment / Questions: 1. Q.)explain the different types of characteristic curves.
4,5&3,5,6

Signature of faculty

**Gokaraju Rangaraju Institute of Engineering and
Technology (Autonomous)**
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 23/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………54………………………… Duration of Lesson: <u>1hr</u>
……………….

Lesson Title: **Net positive suction head problem solving**

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able to write the Net positive suction head
2. Able to understand the Net positive suction head
3. Ability to explain the Net positive suction head
4. Able to solve problem on NPSH

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

> Net positive suction head (NPSH0 definition derivation , calculation. Min NPSH.

Assignment / Questions: 1. Q.)Define NPSH   and obtain the expression., 4,5&3,5,6
2.Asst.)   A centrifugal pump has q=160lit/s =30m,N=1000rpm,at.presure=100000
pa and vapour pressure is 3kpa (abs) find NPSH.

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 23/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL ENGINEERING

Designation: PROFESSOR

Lesson No: …………55……………………… Duration of Lesson: 1hr ……………….

Lesson Title: **various problems covering all methods**

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to relate the Thomas number
2. Able to derive the Thomas number
3. Ability to explain the Thomas number
4. Able to solve problem on Thomas number

TEACHING AIDS   :   White Board and marker

TEACHING POINTS   :

Thomas number and cavitations

Assignment / Questions:
 1. define THOMAS NUMBER   and obtain the expression., (Cob & Co) 4,5&3,5,6
2.   A centrifugal pump has q=190lit/s =30m,N=1000rpm,at.presure=110000 pa and vapour pressure is5 (abs) find NPSH.

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 24/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………56……………………… Duration of Lesson: 1hr …
Lesson Title**: Introduction to Hydro power engineering**:

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to write the definition of Hydro power engineering
2. Able to distinct the layout of Hydro power engineering
3. Ability to explain the Hydro power engineering
4. Able to solve problem on Hydro power engineering

TEACHING AIDS   :   White Board and marker

TEACHING POINTS   :

Hydro power engineering, definition, lay out , types,

Assignment / Questions: 1. Q.) draw Hydro power layout.? (Cob & Co) 4,5&3,5,6

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: 24/6/22

Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL
ENGINEERING

Designation: PROFESSOR

Lesson No: …………57………………………… Duration of Lesson: 1hr
……………….

Lesson Title: **Classification of hydro power plants,**

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be :
1. Able to describe   Classification of hydro power plants
2. Able to illustrate the Classification of hydro power plants
3. Ability to explain the Classification of hydro power plants

TEACHING AIDS   :   White Board and marker
 TEACHING POINTS   :

High head, medium head and low head plants.
Classification of hydro power plants
Pumpedstorage plantsetc.

Assignment / Questions: 1. Q.)explain the type of plants with neat sketch, (Cob & Co)4,5&3,5,6

 2.Asst.) Three turbo-generators each of capacity 10000kw have been installed at a hydel power station . During a certain period of load ,the load on the plant varies from 12000kw 26000kw. calculate 1) total installed capacity 2) load factor 3) plant factor and 4)utilization factor. (Cob & Co) 4,5&3,5,6

of faculty

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22   Date: 24/6/22
Semester : II

Name of the Program : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL
ENGINEERING

Designation: PROFESSOR

Lesson No: …………58………………………… Duration of Lesson: <u>1hr</u>
……………….

Lesson Title: Definition of terms load factor, utilization factor, capacity factor

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able Define the term of load factor
2. Able to understand the utilization factor
3. Ability to explain the capacity factor
4. Able to solve problem on load factor, utilization factor, capacity factor

TEACHING AIDS : White Board and marker

TEACHING POINTS :

load factor, utilization factor, capacity factor

Assignment / Questions: 1. Q.)Define load factor, utilization factor, capacity factor?
(Cob & Co)4,5&3,5,6
2.Asst.) A run-off –river plant has a installed capacity of 15000kw and operates at 30% load factor when it serves as a pick load station. What should be the minimum discharge in the stream so that it may serve as a peak load station? The plant efficiency may be taken as 82% when working under a head of 25m. aslo calculate the maximum load factor of the plant

when the discharge in the stream is 32 m^3/s (Cob & Co)4,5&3,5,6

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)
Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year   :   2021-22   Date: **24/6/22**
Semester   :   II

Name of the Program   : II B.Tech   Section: A

Course/Subject: HYDRAULIC ENGINEERING .Course Code.: GR 20A2019

Name of the Faculty: … DR.MOHD.HUSSAIN………..Dept.: CIVIL

ENGINEERING

Designation: PROFESSOR

Lesson No: …………60………………………… Duration of Lesson: <u>1hr</u>
……………….

Lesson Title: **Estimation of hydropower potential**

<u>INSTRUCTIONAL/LESSON OBJECTIVES:</u>

On completion of this lesson the student shall be :
1. Able to estimation of hydropower potential
2. Ability to explain the estimation of hydropower potential
3. Able to solve problem on estimation of hydropower potential

TEACHING AIDS   : White Board and marker

TEACHING POINTS   :

1.Estimation of hydropower potential, load factor
2. Ratios of load calculation

Assignment / Questions: Define type of power factors? Cob 4,5& Co 3,5,6
2.Asst.) A run-off –river plant has a installed capacity of 20000kw and operates at 40% load factor when it serves as a pick load station. What should be the minimum discharge in the stream so that it may serve as a peak load station? The plant efficiency may be taken as 89% when working under a head of 35m. aslo calculate the maximum load factor of the plant when the discharge in the stream is 39 m^3/s Cob 4,5& Co3,5,6

Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

COURSE COMPLETION STATUS

Academic Year : 2021-2022   **Semester** : **II**

Name of the Program: B. Tech Civil Engg.   **Year:** II Year **Section:**

A **Course/Subject**   : Hydraulic Engineering   **Course Code**: GR20A2019

Name of the Faculty : Dr. Mohd.Hussain   **Designation:**

Professor

Dept.: Civil Engineering

Units	Remarks	Objective Achieved	Outcome Achieved
Unit I	25-03-2022 Unit covered on time	1	1
Unit II	7-04-2022 Unit covered on time	2	2
Unit III	29-04-2022 Unit covered on time	3	3
Unit IV	9-06-2022 Unit covered on time	4	4
Unit V	24-06-2022 Unit covered on time	5	5

Signature of HOD   Signature of faculty

Gokaraju Rangaraju Institute of Engineering and Technology Department of Civil Engineering
EVALUATION STRATEGY

Academic Year   : 2021-2022   **Semester** : **II**

Name of the Program: B. Tech Civil Engg.   **Year:** II Year **Section:**

A **Course/Subject**   : Hydraulic Engineering   **Course Code** :

GR20A2019

Name of the Faculty : Dr. Mohd.Hussain   **Designation:** Professor

Dept.: Civil Engineering

Designation: Professor

1. TARGET:
 a) Percentage for pass: 80%
 b) Percentage of class:

First class with distinction	30
First class	10
Pass class	10
Total strength (No's)	50/63

2. **COURSE PLAN & CONTENT DELIVERY**
- 66 classes held for detailed demonstration of each topic and for analysis of problems in the class.

3. **METHOD OF EVALUATION**

3.1 ☐ Mid Examinations (Mid-I, Mid-II)

3.2 ☐ Assignments

3.3 ☐ Quiz

3.4 ☐ Semester/End Examination

4. List out any new topic(s) or any innovation you would like to introduce in teaching the subjects in this Semester.

Introducing Flipped classroom and Think-pair-share activities via moodle online course.

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440
Mappings of CO's, COB's Vs PO's, POB's

Course Objectives - Course Outcomes Relationship Matrix

Assessment:
1. Assignment   2. Internal Examination   3. External Examination
4. Practical Projects 5. Viva

Course Outcomes / Assessments	1	2	3	4	5
1	X	X	X	X	X
2	X	X	X	X	X
3	X	X	X	X	X
4					
5					

Course Objectives / Assessments	1	2	3	4	5
1	X	X	X	X	X
2	X	X	X	X	X
3	X	X	X	X	X
4					
5					

Course Objectives (COB's) - Course Outcomes (CO's) Relationship Matrix

Course Outcomes / Course Objectives	1	2	3	4	5
1	X				
2		X			

3				X			
4					X		
5						X	

Course Outcomes - Program Outcomes relations (Contributions: High, Medium and Low)

Course Code	Course Title	Course Outcomes	Programme Outcomes											
			a	b	c	d	e	f	g	h	i	j	k	l
GR20 A201 9	Hydraul ic Enginee ring	Describe and predict the various channel sections	H	M	H	H	H		M		M	M	M	M
		Apply dynamic equations in the uniform flows	M	M	M	M	M		H			M	H	M
		Analysing model and prototype similarities	H	H	M	M	H		H			H	M	M
		Visualize the behaviour of hydraulic jump and surface profiles of channel flows	H	M	M	M	H		M			M	H	M
		Evaluate the efficiency of the pumps and hydropower	H	M	H	H	M		M			H	M	M

Course Objectives - Program Outcomes (PO's) Relationship Matrix

Program Outcomes / Course Objectives	a	b	c	d	e	f	g	h	i	j	k	l
1	H	M	H	H	H		M		M	M	M	M
2	M	M	M	M	M		H			M	H	M
3	H	H	M	M	H		H			H	M	M

4	H	M	M	M	H		M			M	H	M
5	H	M	H	H	M		M			H	M	M

Course Outcomes - Program Outcomes relations (PO's) Relationship Matrix

Program Outcomes / Course Outcomes	a	b	c	d	e	f	g	h	i	j	k	l
1	H	M	H	H	H		M		M	M	M	M
2	M	M	M	M	M		H			M	H	M
3	H	H	M	M	H		H			H	M	M
4	H	M	M	M	H		M			M	H	M
5	H	M	H	H	M		M			H	M	M

TUTORIAL SHEET - 1

Academic Year : 2021-2022   **Semester** : **II**

Name of the Program: B. Tech Civil Engg.   **Year:** II Year **Section:**

A **Course/Subject** : Hydraulic Engineering

Course Code : GR20A2019

Name of the Faculty : Dr. Mohd.Hussain   **Designation:**

Professor

Dept.: Civil Engineering

Designation: Professor

This Tutorial corresponds to Unit No.1

1.(a) Derive the most economical or the most efficient section of a rectangular channel

  (b) In a 3m .wide rectangular channel , the discharge is 15 m^3/s. Calculate the critical depth and the specific energy corresponding to the critical depth ?

2 (a) Compare Open Channel flow and Pipe flow

3(a) Define Specific Energy and Specific Energy Curve ? Define also Critical Flow and Discharge Curve

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

TUTORIAL SHEET - 2

Academic Year   : 2021-2022   **Semester** : **II**

Name of the Program: B. Tech Civil Engg.   **Year:** II Year **Section:**

A **Course/Subject**   : Hydraulic Engineering

Course Code : GR20A2019

Name of the Faculty : Dr. Mohd.Hussain   **Designation:**

Professor

Dept.: Civil Engineering

Designation: Professor

This Tutorial corresponds to Unit No.2

1(a) Derive the dynamic equation for Gradually Varied Flow ?

   (b) A rectangular channel 7.5m wide has a uniform depth of flow of 2m. and has a bed slope of 1 in 3000. Calculate the discharge using Manning's formula ? Also calculate Hydraulic Radius ?

2(a) Write short notes on Classification of Channel bottom slopes ?

Objective No.: 2

Outcome No.: 2

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

TUTORIAL SHEET - 3

Academic Year   : 2021-2022   **Semester** : **II**

Name of the Program: B. Tech Civil Engg.   **Year:** II Year **Section:**

A **Course/Subject**   : Hydraulic Engineering   **Course Code** :

GR20A2019

Name of the Faculty : Dr. Mohd.Hussain   **Designation:**

Professor

Dept.: Civil Engineering

Designation: Professor

This Tutorial corresponds to Unit No.3

1. Define (i) Reynolds No. (ii) Froude Number (iii) Mach Number (iv) Weber Number (v) Euler Number
2. Explain Rayleigh's method of Dimensional Analysis ?
3. Explain step by step the Buckingham's Pi Method of Dimensional Analysis ?
4. Describe three types of Similarities of models and prototypes ?
5. Derive the expression for Hydrodynamic force of jet of water on a symmetrical curved vane when jet strikes centrally in two cases :(a) when the curved vane is stationary (b) when the curved vane is moving

Objective No.: 3

Outcome No.: 3

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

TUTORIAL SHEET - 4

Academic Year   : 2021-2022   **Semester** : **II**

Name of the Program: B. Tech Civil Engg.   **Year:** II Year **Section:**

A **Course/Subject**   : Hydraulic Engineering   **Course Code** :
GR20A2019

Name of the Faculty : Dr. Mohd.Hussain   **Designation:**

Professor

Dept.: Civil Engineering

Designation: Professor

This Tutorial corresponds to Unit No.4

   1. (a) Explain the elements and characteristics of Hydraulic jump in a rectangular channel using definition sketch ?

  (b)   A horizontal rectangular channel 4m. wide carries a discharge of 16 m^3/s . Determine whether a jump may occur at an initial depth of 0.5m . or not ? If a jump occurs, determine the sequent depth to this initial depth.Also determine the energy loss in the jump?

2. Derive the expression for work done and efficiency of Pelton turbine with neat diagrams of inlet and outlet velocity triangles ?

3 Derive the expression for work done and efficiency of Francis Turbine with neat diagrams of inlet and outlet velocity triangles ?

4. Derive the expression for work done and efficiency of Kaplan turbine with neat diagrams of inlet and outlet velocity triangles ?

5. Explain Draft tube theory and efficiency of draft tube ?

6. Describe (a) Governing of turbines (b) Performance Characteristic Curves of turbines

Gokaraju Rangaraju Institute of Engineering and Technology (Autonomous)

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

TUTORIAL SHEET - 5

Academic Year   : 2021-2022   **Semester** : **II**

Name of the Program: B. Tech Civil Engg.   **Year:** II Year **Section:**

A **Course/Subject**   : Hydraulic Engineering

Course Code : GR20A2019

Name of the Faculty : Dr. Mohd.Hussain   **Designation:**

Professor

Dept.: Civil Engineering

Designation: Professor

This Tutorial corresponds to Unit No.5   1.
1.Explain the components and different heads of centrifugal pump with neat sketch ?
2. Derive the expression for work done and efficiency of centrifugal pump with neat
diagrams of inlet and outlet velocity triangles ?
3. Derive the expressions for (a) Minimum starting speed of a centrifugal pump (b) Net
Positive Suction Head (NPSH)
4. Define classification of Hydropower plants?
5. Define (i) Load factor (ii) Utilization factor (iii) Capacity factor

Objective No.: 5

Outcome No.: 5

ASSIGNMENTS

Problem on Rayleigh Method

Using Rayleigh Method , find an expression for the drag force on smooth sphere of diameter D that moves with a uniform velocity V in a fluid of density $\acute{\rho}$ and dynamic viscosity μ.

Problem on Buckingham 's Pi Method

The resisting force R of a supersonic plane during flight depends on the length of the aircraft " l", velocity V , air viscosity μ, air density $\acute{\rho}$ and Bulk Modulus of air K . Using Buckingham π theorem , find the functional relationship among these variables.

Problems on Hydraulic similitude and Model studies

1. In 1 in 50 model of a spillway , the velocity and discharge are 3 m/s and 4 m_3/s .Find the corresponding velocity and discharge in the prototype
2. The pressure drop in an aeroplane model of size 1/15 of its prototype is 90 N/cm_2.The model is tested in water.Find the corresponding pressure drop in the prototype.Take density of air – 1.24 kg/m_3. The viscosity of water is 0.01 poise while the viscosity of air is 0.00022 poise.

Problems on Impact of jets

A jet of water having a velocity of 25m/s strikes a series of radial curved vanes mounted on a wheel which is rotating at 250 rpm .The jet makes an angle of 20_0 with the tangent to the wheel at inlet and leaves the wheel with a velocity of 5 m/s at an angle of 140_0 to the tangent to the wheel at outlet. Water is flowing from outward in a radial direction.The outer and inner radii of the wheel are 0.8m and 0.4m respectively . Determine (a) Vane angles at inlet and outlet (b) work done per unit weight of water (c) Efficiency of the wheel .

Problem on Pelton wheel

A Pelton wheel has a mean bucket speed of 12 m/second with a jet of water flowing at the rate of 800 litres/second under a head of 40m.The buckets deflect the jet through an angle of 155_0.Calcualte the power given by water to the runner and the hydraulic efficiency of the turbine. Assume Coefficient of Velocity as 0.95.

Problem on Francis Turbine .

A Francis turbine with an overall efficiency of 80% is required to produce 150 KW power. It is working under a head of 8m. The peripheral velocity = $0.3\sqrt{2gH}$ and the radial velocity of flow at inlet is $0.9\sqrt{2gH}$. The wheel runs at 160 rpm and the hydraulic losses in the turbine are 24% of the available energy .Assuming radial discharge , determine (i) the guide blade angle (ii) the wheel vane angle at inlet (iii) diameter of the wheel at inlet and (iv)width of wheel at inlet

Problem on Kaplan Turbine

A Kaplan turbine working under a head of 22m. develops 12000Kw shaft power. The outer diameter of the runner is 3.8m and hub diameter is 1.9m.The guide blade angle at the extreme edge of the runner is 38_0. The hydraulic and overall efficiencies of the turbines are 90% and 86% respectively.If the Velocity of whirl is zero at outlet , determine (i) Runner vane angles at inlet and outlet at the extreme edge of the runner (ii) speed of the turbine .

Problem on Draft tube

The velocity heads of water at the inlet and outlet section of a draft tube are 3m. and 0.2 m respectively.The frictional and other losses in the draft tube are 0.4 m . What is the efficiency of the draft tube ? (Engineering Services Examination-2015)

Problems on Centrifugal Pumps on work done and efficiency & Minimum Starting Speed

1.The internal and external diameters of the impeller of a centrifugal pump are 250mm and 500mm. respectively. The pump is running at 1300 rpm. The vane angles of the impeller at inlet and outlet are 25_0 and 35_0 respectively.The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per unit weight of water.

2. A centrifugal pump with 1.4 m diameter runs at 250 rpm and pumps 2020 litres/ s , the average lift being 8m. The angle which the vanes make at exit with the tangent to the impeller is 28_0 and the radial velocity of flow is 3 m/s. Determine the manometric efficiency and the minimum speed to start pumping against a head of 8m. Take the inner diameter of the impeller as 0.6m.

3. A centrifugal pump discharges 260 litres of water per second when running at 600

rpm.The impeller diameter at the outlet is 80 cm. It develops a head of 15.3 m. What is the

approximate minimum starting speed .(Engineering Services Examination 2004).

1.

RUBRIC TEMPLATE

Academic Year   : 2021-2022   **Semester** : **II**

Name of the Program: B. Tech Civil Engg.   **Year:** II Year **Section:**

A **Course/Subject**   : Hydraulic Engineering   **Course Code** : GR20A2019

Name of the Faculty : Dr. Mohd.Hussain   **Designation:** Professor

Dept.: Civil Engineering

Objective: To apply Chezy's equation and Manning's equation, predict nonuniform flow in open channels, analyse the dimensions of model with prototype , identify the hydraulic jump losses , surface profiles and channel bed slopes &compute work done by turbines and pumps

Student Outcome: To predict various economical channel sections, apply dynamic equation in the nonuniform flows, analyse model and prototype similarities , visualize the behaviour of hydraulic jump and evaluate the efficiency of pumps and turbines.

S. N o	Name of the Stude nt	Performance Criteria	Beginning	Developing	Reflecting Developmen t	Accomplis hed	Exemplary	Score
			1	2	3	4	5	
1	2124 5A01 05	The level of knowledge on basic equations of uniform flows	Low level of knowledge on basic equations of uniform flows	Able to discuss the basic equations of uniform flows	Ability to explain the basic equations of uniform flows	Full knowled ge on basic equations of uniform flows	Analysing and implementi ng the knowledge of basic equations of uniform flows	5
		The level of knowledge on analysis for dynamic equations in the nonunifor m flows	Low level of knowledge on analysis for dynamic equations in the nonunifor m flows	Able to discuss on analysis for dynamic equations in the nonunifor m flows	Ability to explain analysis for dynamic equations in the nonunifor m flows	Full knowled ge on analysis for dynamic equations in the nonunifo rm flows.	Analysing and application of knowledge on analysis for dynamic equations in the nonuniform flows.	5
		The level of knowledge in understand ing model and prototype similarities	Low level of knowledge in understand ing model and prototype similarities	Ability to discuss in understan ding model and prototype similaritie s.	Ability to explain in understand ing model and prototype similarities	Full knowled ge in understan ding model and prototype similariti es.	Analysing and implementi ng the knowledge in understandi ng model and prototype similarities.	5
							Average Score	5

S. N o	Name of the Stude nt	Performance Criteria	Beginning	Developing	Reflecting Development	Accomplishe d	Exemplary	Score
			1	2	3	4	5	
1	2124 1A01 27	The level of knowledge on basic equations of uniform flows	Low level of knowledge on basic equations of uniform flows	Able to discuss the basic equations of uniform flows	Ability to explain the basic equations of uniform flows	Full knowledge on basic equations of uniform flows	Analysing and implement ing the knowledg e of basic equations of uniform flows	5
		The level of knowledge on analysis for dynamic equations in the nonuniform flows	Low level of knowledge on analysis for dynamic equations in the nonuniform flows	Able to discuss on analysis for dynamic equations in the nonunifor m flows	Ability to explain analysis for dynamic equations in the nonuniform flows	Full knowledge on analysis for dynamic equations in the nonuniform flows.	Analysing and applicatio n of knowledg e on analysis for dynamic equations in the nonunifor m flows.	4
		The level of knowledge in understandi ng model and prototype similarities	Low level of knowledge in understandi ng model and prototype similarities	Ability to discuss in understan ding model and prototype similaritie s.	Ability to explain in understandi ng model and prototype similarities	Full knowledge in understandi ng model and prototype similarities.	Analysin g and implement ing the knowledg e in understan ding model and prototype similaritie s.	4

								Average Score	4.33

			Beginning	Developing	Reflecting Development	Accomplished	Exemplary	Score
S. No	**Name of the Student**	**Performance Criteria**	**1**	**2**	**3**	**4**	**5**	
		The level of knowledge on basic equations of uniform flows	Low level of knowledge on basic equations of uniform flows	Able to discuss the basic equations of uniform flows	Ability to explain the basic equations of uniform flows	Full knowledge on basic equations of uniform flows	Analysing and implementing the knowledge of basic equations of uniform flows	4
1	2124 1A01 02	The level of knowledge on analysis for dynamic equations in the nonuniform flows	Low level of knowledge on analysis for dynamic equations in the nonuniform flows	Able to discuss on analysis for dynamic equations in the nonuniform flows	Ability to explain analysis for dynamic equations in the nonuniform flows	Full knowledge on analysis for dynamic equations in the nonuniform flows.	Analysing and application of knowledge on analysis for dynamic equations in the nonuniform flows.	3
		The level of knowledge in understanding model and	Low level of knowledge in understanding model and	Ability to discuss in understanding model and prototype similaritie	Ability to explain in understanding model and prototype similarities	Full knowledge in understanding model and prototype	Analysing and implementing the knowledge in understan	2

		prototype similarities	prototype similarities	s.		similarities.	ding model and prototype similaritie s.	
							Average Score	3

GR20 2021-22 B.Tech CE 220, Section: A GR20A2019 Hydraulic Engineering - II Sessional Marks

S.No	Roll No	MID-I Marks	MID-II Marks	Tutorial Marks	Assessment Marks	Sessional Marks
1	20241A0101	7	9	5	5	22
2	20241A0102	1	5	5	5	13
3	20241A0103	3	4	5	5	14
4	20241A0104	8	11	5	5	20
5	20241A0105	4	6	5	5	15
6	20241A0106	4	7	5	5	16
7	20241A0107	1	2	5	5	12
8	20241A0108	AB	4	5	5	12
9	20241A0109	1	6	5	5	14
10	20241A0110	3	10	5	5	17
11	20241A0111	1	3	5	5	12
12	20241A0112	14	14	5	5	24
13	20241A0113	3	8	5	5	16
14	20241A0114	2	6	5	5	14
15	20241A0115	5	8	5	5	17
16	20241A0116	10	13	5	5	22
17	20241A0117	16	15	5	5	26
22	20241A0122	14	13	5	5	24
19	20241A0119	11	10	5	5	21
20	20241A0121	4	9	5	5	17
21	20241A0122	14	16	5	5	25
22	20241A0123	16	9	5	5	23
23	20241A0124	AB	5	5	5	13
24	20241A0125	5	8	5	5	17
25	20241A0126	5	5	5	5	15
26	20241A0127	6	10	5	5	22
27	20241A0128	5	7	5	5	16
28	20241A0129	15	15	5	5	25
29	20241A0130	1	2	5	5	12
30	20241A0131	7	13	5	5	20
31	20241A0132	9	8	5	5	19
32	20241A0133	2	5	5	5	14
33	20241A0134	3	12	5	5	22
34	20241A0135	3	5	5	5	14
35	20241A0136	16	19	5	5	28
36	20241A0137	22	20	5	5	29
37	20241A0138	AB	8	5	5	14

38	20241A0139	4	7	5	5	16
39	20241A0140	7	11	5	5	19
40	20241A0141	1	5	5	5	13
41	20241A0142	19	13	5	5	26
42	20241A0143	11	11	5	5	21
43	20241A0144	16	20	5	5	28
44	20241A0146	AB	7	5	5	14
45	20241A0147	7	6	5	5	17
46	20241A0148	2	5	5	5	14
47	20241A0149	7	11	5	5	19
48	20241A0150	20	20	5	5	30
49	20241A0151	5	12	5	5	19
50	20241A0152	5	7	5	5	16
51	20241A0153	14	10	5	5	22
52	20241A0154	17	15	5	5	26
53	20241A0155	12	10	5	5	21
54	20241A0156	5	10	5	5	22
55	20241A0157	6	13	5	5	20
56	20241A0158	16	20	5	5	28
57	20241A0159	4	5	5	5	15
58	20241A0160	7	8	5	5	22
59	21245A0101	16	20	5	5	28
60	21245A0102	15	16	5	5	26
61	21245A0103	15	19	5	5	27
62	21245A0104	14	16	5	5	25
63	21245A0105	19	20	5	5	30

Gokaraju Rangaraju Institute of Engineering & Technology
(Autonomous College Affiliated to JNTUH)
Bachupally, Kukatpally, Hyderabad - 500090

(12 Pages)

T. Bhargavi

I	II	**MID TERM EXAMINATION**

No. 140293

H.T. No.	2	0	2	4	1	A	0	1	5	0

Name of the Examination **HYDRAULIC ENGINEERING**

Course **Btech 3nd year**   Branch **Civil**   Date **5/5/2022**

Signature of the Invigilator

Q.NO.	1		2		3		4		5		6		TOTAL	
	a	b	a	b	a	b	a	b	a	b	a	b		15
MARKS	2	3			2	3			2	3			15	15

START WRITING FROM HERE

1a) Three types of similarities in the model and prototype are

1) Geometrical similarity
2) Dynamic similarity
3) kinematic similarity

1) Geometrical similarity:-

The geometric similarity in the model and prototype exists when the lengths are equal

$$L_r = \frac{L_m}{L_p} = \frac{b_m}{b_p} = \frac{d_m}{d_p}$$

$$Area(A_r) = \frac{A_m}{A_p} = \frac{L_m \times b_m}{L_p \times b_p} = L_r^2$$

Dynamic similarity

Dynamic similarity exists when velocity and

Gokaraju Rangaraju Institute of Engineering & Technology
(Autonomous College Affiliated to JNTUH)
Bachupally, Kukatpally, Hyderabad - 500090

(12 Pages)   J. Jayants

I	II	**MID TERM EXAMINATION**

No.   924676

H.T. No.

2	0	2	4	1	A	0	1	1	8

Name of the Examination IInd B.tech IInd semister Ist Mid term

Course Hydralic Engineering Branch civil   Date 5/5/2022.

Signature of the Invigilator

Q.NO.	1		2		3		4		5		6		TOTAL
	a	b	a	b	a	b	a	b	a	b	a	b	
MARKS	1½	3	—		0	1	—		2	1	—		8½

(circled) 9 / 15

START WRITING FROM HERE

'let 'B' be the bottom width
of the rectangular channel 'y' be
the depth of flow

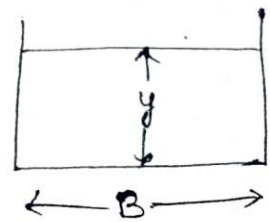Area = A = By —①

wetted perimeter p = B+2y —②

B = A/y Sub in ②

$$P = \frac{A}{y} + 2y$$

differentiate w.r.to 'y'

$$\boxed{\frac{dp}{dy} = \frac{-A}{y^2} + 2}$$

for most economical section $\frac{dp}{dy} = 0$

No. 407730 H.T. No. | 2 | 1 | 2 | 4 | 5 | A | 0 | 1 | 0 | 5 |

Name of the Examination II BTech II Sem Mid II Examination

Course HE Branch Civil Engineering Date 1/07/22

Signature of the Invigilator

Q.NO.	1		2		3		4		5		6		TOTAL	
	a	b	a	b	a	b	a	b	a	b	a	b		
MARKS	2	3					2	2	2	3			5	

START WRITING FROM HERE

a)

Let the jet of water striking

on a stationary · vertical plate

with a velocity 'V'
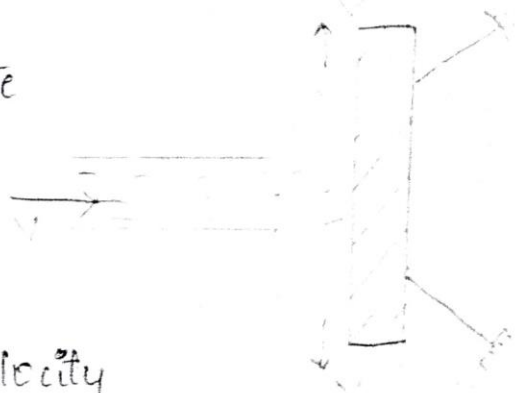
Force exerted by jet per second

= Mass per second (Initial velocity
- final velocity)

= $\rho a V (V - 0)$

= $\rho a V^2$

Gokaraju Rangaraju Institute of Engineering & Technology
(Autonomous College Affiliated to JNTUH) (12 Pages)
Bachupally, Kukatpally, Hyderabad - 500090

| I | II | MID TERM EXAMINATION |

No. 40785   H.T. No. 2 0 2 4 1 A 0 1 3 1

Name of the Examination IInd Btech – IInd SEM – IInd MID EXAMS (2nd Mid)

Course Hydraulic Engineering   Branch Civil engineering Date 01/07/2022

Signature of the Invigilator

Q.NO.	1		2		3		4		5		6		TOTAL
	a	b	a	b	a	b	a	b	a	b	a	b	
MARKS													

START WRITING FROM HERE

a)

Force exerted by jet on a stationary vertical plate is the flow of direction of jet.

F_x = Mass of the water striking (Intial velocity – Final velocity)

$\quad = \dfrac{Mass}{Time}(v-0)$

$\left(\dfrac{Mass}{time} = \rho a v = \rho Q\right)$

$\quad = \rho a v (v-0)$

$F_x = \rho a v^2$

where, a = crossection area of the jet

II B.Tech II Semester Regular Examinations, July/August 2022

HYDRAULIC ENGINEERING
(Civil Engineering)

Time: 3 hours   Max Marks: 70

Instructions:

1. Question paper comprises of **Part-A** and **Part-B**
2. **Part-A** (for 20 marks) must be answered at one place in the answer book.
3. **Part-B** (for 50 marks) consists of **five questions with internal choice,** answer all questions.

PART – A
(Answer ALL questions. All questions carry equal marks)

                                                    10 * 2 = 20 Marks

1. a.   Write down conditions for most economical trapezoidal channel. $Co1 - BL1$ [2]

   b.   Establish relation between Chezy's and Manning's coefficients. $Co1 - BL2$ [2]

   c.   List out discharge measuring devices. $Co2 - BL-1$ [2]

   d.   Differentiate Gradually and Rapidly varied flow. $Co2 - BL-2$ [2]

   e.   Explain the term Dimensional Homogeneity. $Co3 - BL-2$ [2]

   f.   Write an expression for force exerted by a jet of water on a moving curved plate at centre, in the direction of motion of plate $Co4 - BL-1$ [2]

   g.   Mention any two applications of hydraulic jump. $Co4 - BL-1$ [2]

   h.   Mention functions of draft tubes. $Co5 - BL-1$ [2]

   i.   Define Cavitation. $Co5 - BL-1$ [2]

   j.   How do you classify Hydropower plants? $Co5 - BL-4$ [2]

PART – B
(Answer ALL questions. All questions carry equal marks)

                                                    5 * 10 = 50 Marks

2.   (a) Derive the equation for Chezy's constant for a flow in a uniform cross section of a channel. $Co1 - BL-3$ [10]

   (b) A rectangular channel carries water at the rate of 400 liters/sec when bed slope is 1 in 2000. Find the most economical dimensions of the channel if C=50. $(Co1) - BL-3$

                                   OR

3.   (a) Differentiate between pipe flow and open channel flow. $Co1 - BL-4$ [10]

   (b) For a constant specific energy of 3 kg-m/kg. Calculate the maximum discharge that may occur in a rectangular channel 3 m wide? $Co1 - BL-3$

4. (a) Explain with neat sketch, measurement of velocity in stream flow using Current [10]
    meter. $Co2 - \beta C - 2$

    (b) Explain gradually varied flow profiles along with neat sketches. $Co2 - \beta L - 2$

<div align="center">OR</div>

5. (a) Find the rate of change of depth of water in a rectangular channel of 12 m wide and [10]
    2m deep, when the water is flowing with a velocity of 1.5 m/s. The flow of water $Co2 - \beta L - 3$
    through the channel of bed slope 1 in 300, is regulated in such a way that energy
    line is having a slope of 1 in 8000.

    (b) Classify the channel bottom slopes. Explain mild and steep slope channels with few $Co2 - \beta L - IV$
    examples.

6. (a) What are the methods of Dimensional analysis. Describe Rayleigh's methods for [10]
    dimensional analysis. $Co2 - \beta L - 1$

    (b) In 1 in 40 model of a spillway, the velocity and discharge are 2m/s and 2.5 m³/s.
    Find corresponding velocity and discharge in the prototype. $Co3 - \beta L - 3$

<div align="center">OR</div>

7. (a) Derive an expression for the hydrodynamic force exerted by a fluid jet striking a [10]
    moving symmetrical curved vane at centre? $Co4 - \beta L - 3$

    (b) A 7.5 cm cm diameter jet having a velocity of 30 m/s strikes a flat plate, the normal
    of which is inclined at 45° to the axis of the jet. Find the normal pressure on the
    plate (i) When the plate is stationary and (ii) When the plate is moving with a $Co4 - \beta L - 3$
    velocity of 15 m/s and away from the jet. Also determine power and efficiency of
    the jet when the plate is moving.

8. (a) Derive an expression for the depth of hydraulic jump in terms of the upstream [6]
    Froude's number. $Co4 - \beta L - 3$

    (b) The depth of flow of water, at a certain section of the rectangular channel of 5m [4]
    wide, is 0.6m. The discharge through the channel is 15 m³/s. If a hydraulic jump
    takes place on the downstream side, find the depth of flow after the jump. $Co4 - \beta L - 3$

<div align="center">OR</div>

9. (a) Explain in detail elements of hydroelectric power plant with neat sketch. $Co5 - \beta L - 6$

    (b) What are the elements and characteristics of hydraulic jump in a horizontal
    rectangular channel. $Co4 - \beta L - 4$

CODE: GR20A2019   GR 20   SET- 2

10. (a) Draw and discuss the operating characteristics of a centrifugal pump. — CO5 — BL-2 [6]

(b) A turbine develops 7357.5 kW Shaft Power when running at 200 r.p.m. The head [4] on the turbine is 10 m. If the head on the turbine is reduced to 25 m, determine the speed and specific speed of the turbine. CO5 — BL-3

OR

11. (a) Explain governing of turbines with neat sketch. CO5 — BL-2 [6]

(b) Explain in detail about the estimation of hydropower potential. CO5 — BL-2 [4]

*****

Name:_____   **Hall Ticket No**.

						A			

Answer All Questions.   **All Questions Carry Equal Marks.**

Time: 10 Min.   **Date of Exam:5-5-2022**   **Marks: (10 X 0.5 = 5)**

Choose the correct alternative:

Question No.	Questions	Blooms Levels*	Course Outcome
1	Uniform flow in a channel is characterized by the following statement ( ) (a) Total energy remains constant along the channel (b) Gradient of the total energy is parallel to the channel bed (c) Specific energy decreases along the channel (d) Total energy line either rises or falls depending upon the Froud Number	BL 1	CO1
2	Evaluate the dimensions of Manning's Roughness Coefficient "n" are ( ) (a) $L^{1/2} T^{-1}$ (b) $L^{-1/3} T$ (c) $M^0 L^0 T^0$ (d) L	BL 5	CO1
3	Which of the following condition is the Chief Characteristic of Critical flow ? ( ) (a) $\dfrac{Q^2 T}{g A^3} = 1$ (b) $\dfrac{Q T^2}{g A^3} = 1$ (c) $\dfrac{Q^2 R}{g A^3} = 1$ (d) $\dfrac{Q^2 T^2}{g A^3} = 1$	BL 1	CO1
4	In a rectangular channel ,if the critical depth is 2m., specific energy at critical depth is ( ) (a) 3 m (b) 1.5 m (c) 2m. (d) 12.5 m	BL 3	CO1
5	In a rectangular channel, if the critical depth is 1.6 m. and the specific energy at that section is 2.7m . Analyze the flow to be ( ) (a) Subcritical (b) supercritical (c) critical (d) not possible	BL 4	CO1
6	For a given discharge in a horizontal frictionless channel, two depths may have the same specific force . These two depths are known as ( ) (a) Specific depths (b) sequent depths (c) alternate depths (d) Normal and Critical depths	BL 1	CO1

7	A model of reservoir is emptied in 10 minutes . If the model scale is 1:25, the time taken by the prototype to empty itself , would be ( ) (a) 250 minutes (b) 50 minutes (c) 6250 minutes (d) 2 minutes	BL 3	CO3
8	A geometrically similar spillway model is constructed to a scale of 1:16.Corresponding to a discharge of 1024 cumecs in the prototype , the discharge in the model (in cumecs) will be ( ) (a) 1 (b) 12 (c) 16 (d) 64	BL 5	CO3
9	If E= Specific Energy at a section in a Gradually Varied Flow, then dE/dx = ( ) (a) $S_0 + S_f$ (b) $S_0 - S_f$ (c) S_f-S_0 (d) $S_f/S_0- 1$ Where S_f : Energy Slope S_0 : Bed Slope	BL2	CO2
10	The following gradually varied flow profiles do not exist ( )	BL1	CO2

Time: 9a0 Minutes   Date of Exam:5-5-2022   Max Marks: (3 X 5 = 15)
Answer All Questions:

Question No	Unit	Bloom Levels*	Course Outcome
1	(a)What are conditions for the most economical or the most efficient section of a rectangular channel and trapezoidal channel? (2 Marks)	BL 1	CO 1
	(b) In a 3m .wide rectangular channel , the discharge is 15 m^3/s. Calculate the critical depth and the specific energy corresponding to the critical depth ? (3 Marks)	BL 3	CO 1
OR			
2	(a) How do we evaluate the critical flow in case of rectangular channels (2 Marks)	BL 5	CO 1
	(b) A trapezoidal channel is 10m. wide and has a side slope of 1.5 Horizontal and I Vertical. The bed slope is 0.0003. The channel is lined with smooth concrete of n = 0.012 .Evaluate the mean velocity and discharge for a depth of flow of 3m. (3 Marks)	BL5	CO1
3	(a)Write short notes on classification of surface profiles ? (2 Marks)	BL 5	CO 2
	(b) A rectangular channel 7.5m wide has a uniform depth of flow of 2m. and has a bed slope of 1 in 3000. Evaluate the discharge using Manning's formula ? Also calculate the Hydraulic Radius ? (3 Marks)	BL 5	CO2
OR			
4	(a) Explain briefly the computation of the water surface profile by Direct Step Method ?(2 Marks)	BL 5	CO 2
	(b) A 2.25 m wide rectangular channel has a flow with a velocity of 1.35 m/s and a depth of 1.2m. A smooth hump is to be built at a section to create critical flow conditions over the hump. Evaluate the minimum height of the hump required to achieve this (3 Marks)	BL5	CO2
5	(a) Explain three types of similarities in the model and prototype ? (2 Marks)	BL 5	CO3
	(b) A model of a submarine is constructed to a scale of 1:5.Find the velocity of air in a wind tunnel to simulate the submarine speed of 10m/s in water .Kinematic viscosity of sea water and air are 0.0104 and 0.15 stokes respectively. Density of water and air are 1025 and 1.21 kg/m^3 respectively. (3 Marks)	BL5	CO3
OR			
6	(a) A 1.0 m long model of a ship is towed in a towing tank at a speed of 81cm/s.To what speed of the ship of 64 m.long does this correspond ? (2 Marks)	BL 5	CO3
	(b) Explain the Buckingham Pi Method of dimensional analysis (3 Marks)	BL5	CO3

Name: _____   **Hall Ticket No**.

							A		

Answer All Questions.   **All Questions Carry Equal Marks.**

Time: 10 Min.   **Date of Exam:01/07/2022**   **Marks: (10 X 0.5 = 5)**

Choose the correct alternative:

Question No.	Questions	Blooms Levels*	Course Outcome
1	For a Froud Number of a Hydraulic jump is 5.5.The jump can be classified as ( ) (a)Undular Jump (b)Oscillating jump (c) Weak jump (d) Steady jump	BL 1	CO1
2	In a hydraulic jump, the depth on two sides are 0.4m and 1.4m.The head loss in the jump is nearly ( ) (a)0.45 (b) 0.65 (c) 0.8 (d)0.9	BL 1	CO1
3	Impact of jet is the force exerted due to ( ) (a) change in momentum of the mass coming out of jet (b) Change in Kinetic energy of the mass coming out of jet (c) Inertia of motion of the mass coming out of jet (d) Weight of the mass coming out of jet	BL 1	CO1
4	When a steady two dimensional jet of water impinges on a stationary inclined plate and if the fluid friction is neglected, the resultant force on the plate ( ) (a) is tangential to the surface (b) normal to the surface (c) is in the direction of jet flow (d) is normal to the direction of jet	BL 3	CO1
5	A turbine is a device which converts ( ) (a) Hydraulic energy into mechanical energy (b) Mechanical energy into hydraulic energy (c) Kinetic energy into mechanical energy (d) Electrical energy into mechanical energy	BL 2	CO1
6	A pump is defined as a device which converts ( ) (a) Hydraulic energy into mechanical energy (b) Mechanical energy into hydraulic energy (c) Kinetic energy into mechanical energy (d) Electrical energy into mechanical energy	BL 1	CO1

7	The first operation of a centrifugal pump is ( ) (a) Governing (b) Priming (c) Fuelling (d) None of the above	BL 3	CO4
8	If the head on the turbine is more than 300m., the type of turbine used should be ( ) (a)Kaplan (b) Francis (c) Pelton (d) Propeller	BL 5	CO4
9	To produce a high head by multistage centrifugal pumps, the impellers are connected ( ) (a) in parallel (b) in series (c) both in series and parallel (d) none of the above	BL2	CO2
10	Cavitation in pumps will take place if the pressure of the flowing fluid at any point is ( ) (a) more than vapour pressure of the fluid (b) equal to the vapour pressure of the fluid (c) is less than the vapour pressure of the fluid (d) none of the above	BL1	CO1

Question No	Unit	Bloom Levels*	Course Outcome
1	(a) Write the equation for the force exerted by jet on a stationary verticalplate ? (2 Marks)	BL 1	CO 3
	(b) Derive an expression for the force exerted by a fluid jet striking centrally on a curved vane and moving in the direction of the jet in horizontal direction ? (3 Marks)-	BL 5	CO 3
OR			
2	(a) What are the characteristic curves of turbines ? (2 Marks)	BL 1	CO 3
	(b) Derive the equation for work done and efficiency of aFrancis Turbine ? (3 Marks)	BL5	CO3
3	(a) Explain the elements and characteristics of Hydraulic jump in arectangular channel using definition sketch ? (2 Marks)	BL 1	CO 4
	(b) In a hydraulic jump occurring in a horizontal rectangular channel, thesequent depth ratio is 8.0 and Froud number leaving the jump is 0.265.Calculate the Froud Number of the flow entering the jump ? (3 Marks)	BL3	CO4
OR			
4	(a) Write the equations for work done and efficiency of Peltonturbine ?(2 Marks)	BL 1BL3	CO 4
	(b) A Pelton wheel has a mean bucket speed of 12m/second witha jet of water flowing at the rate of 800 litres/second under a head of 40m.The buckets deflect the jet through an angle of 155 degrees. Calculate the power given by water to the runner (3 Marks)		CO4
5	(a) Explain the components and different heads of centrifugal pump withneat sketch ? (2 Marks)	BL 1BL5	CO5
	(b)The internal and external diameters of the impeller of a centrifugal pump are 250mm and 500mm. respectively. The pump is running at 1300 rpm. The vane angles of the impeller at inlet and outlet are 25^0 and 35^0 respectively.The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per unit weight of water.(3 Marks)		CO5
OR			
6	(a) Explain the classification of Hydropower plants?(2 Marks)	BL 1	CO5
	(b) Derive the expression for work done and efficiency of centrifugal pumpwith neat diagrams of inlet and outlet velocity triangles ?(3 Marks)	BL5	CO5