

**DEPARTMENT OF WATER RESOURCES DEVELOPMENT AND MANAGEMENT
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code : **XXX M.Tech. (Water Resources Development)/P.G. Diploma in Water Resources Development**
 Department : **Department of Water Resources Development and Management**
 Year : **I**
 Model : **2**

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1.		Program Core Course-I	PCC	4	3	1	0	3	0
2.		Program Core Course-II	PCC	4	3	0	2	3	0
3.		Program Core Course-III	PCC	4	3	0	2	3	0
4.		Program Core Course-IV	PCC	4	3	0	2	3	0
5.		Social Science Course	SSC	2	-	-	-	-	-
		Total		18					
Semester-II (Spring)									
1.		Program Elective-I	PEC	4	-	-	-	-	-
2.		Program Elective-II	PEC	4	-	-	-	-	-
3.		Program Elective-III	PEC	4	-	-	-	-	-
4.		Program Elective-IV	PEC	4	-	-	-	-	-
5.		Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-	-
6.	WRC-700	Seminar	SEM	2	-	-	-	-	-
		Total		21					
<i>Note: P.G. Diploma course in WRD shall be of One Year duration comprising of semesters I and II only, with a minimum credit of 39</i>									

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Program Code : **XXX M.Tech. (Water Resources Development)/P.G. Diploma in Water Resources Development**
 Department : **Department of Water Resources Development and Management**
 Year : **II**
 Model : **2**

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	WRC-691	Internship Social Activity	ISA	4	-	-	-	-	-
2.	WRC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		Total		14					
Semester-II (Spring)									
1.	WRC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		Total		14					

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	18	21	14	14
Total Credits	67			

M.Tech. (Water Resources Development)/P.G. Diploma in Water Resources Development

Program Core Courses (for CE/EE/ME backgrounds)

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
For Civil Backgrounds									
1.	WRC-501	Design of Water Resources Structures	PCC	4	3	0	2	3	0
2.	WRC-503	Water Resources Planning and Management	PCC	4	3	1	0	3	0
3.	WRC-505	Applied Hydrology	PCC	4	3	0	2	3	0
4.	WRC-507	System Design Techniques	PCC	4	3	0	2	3	0
For Electrical Backgrounds									
1.	WRC-511	Hydro Generating Equipment	PCC	4	3	0	2	3	0
2.	WRC-513	Hydropower System Planning	PCC	4	3	1	0	3	0
3.	WRC-515	Project Planning and Management	PCC	4	3	0	2	3	0
4.	WRC-517	Hybrid Renewable Energy System	PCC	4	3	0	2	3	0
For Mechanical Backgrounds									
1.	WRC-513	Hydropower System Planning	PCC	4	3	1	0	3	0
2.	WRC-521	Design of Hydro Mechanical Equipment	PCC	4	3	0	2	3	0
3.	WRC-515	Project Planning and Management	PCC	4	3	0	2	3	0
4.	WRC-517	Hybrid Renewable Energy System	PCC	4	3	0	2	3	0

M.Tech. (Water Resources Development)/P.G. Diploma in Water Resources Development
Program Elective Courses

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	WRL-501	Geotechnical Engineering	PEC	4	3	1	0	3	0
2.	WRL-502	Hydropower and Appurtenant Works	PEC	4	3	1	0	3	0
3.	WRL-503	Earth and Rockfill Dams	PEC	4	3	1	0	3	0
4.	WRL-504	Masonry and Concrete Dams	PEC	4	3	1	0	3	0
5.	WRL-505	Irrigation Structures	PEC	4	3	1	0	3	0
6.	WRL-507	River Engineering	PEC	4	3	0	2	3	0
7.	WRL-508	Finite Element Methods	PEC	4	3	1	0	3	0
8.	WRL-509	Water Resources System Reliability	PEC	4	3	1	0	3	0
9.	WRL-510	Environmental Impact Assessment of Water Resource Projects	PEC	4	3	1	0	3	0
10.	WRL-511	Groundwater Hydrology	PEC	4	3	1	0	3	0
11.	WRL-512	Climate Change and Water Resources	PEC	4	3	1	0	3	0
12.	WRL-513	Substation and Transmission line Design	PEC	4	3	1	0	3	0
13.	WRL-514	Installation Maintenance and Testing of Hydro Generating Equipment	PEC	4	3	1	0	3	0
14.	WRL-515	Maintenance Management in Power Plants	PEC	4	3	1	0	3	0
15.	WRL-516	Power System Management	PEC	4	3	1	0	3	0
16.	WRL-517	Electrical Design of Hydro Power Station	PEC	4	3	1	0	3	0
17.	WRL-518	Power System Operation and Control	PEC	4	3	1	0	3	0
18.	WRL-519	Control and Instrumentation of Hydro Power Plant	PEC	4	3	1	0	3	0
19.	WRL-520	Power System Analysis	PEC	4	3	1	0	3	0
20.	WRL-521	Power System Reliability	PEC	4	3	1	0	3	0
21.	WRL-522	Insulating Systems	PEC	4	3	1	0	3	0
22.	WRL-523	Planning and Design of Small Hydro Power Schemes	PEC	4	3	1	0	3	0
23.	WRL-524	Power Electronics Controlled Hydro-Electric Systems	PEC	4	3	1	0	3	0
24.	WRL-525	Modelling and Simulation of Hydro-Electric Energy Systems	PEC	4	1	1	4	2	2

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Program Elective Courses

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
25.	WRL-526	Synchronous and Asynchronous Generators Laboratory	PEC	4	1	0	6	0	3
26.	WRL-527	Power Electronics Laboratory	PEC	4	1	0	6	0	3
27.	WRL-528	Control and Instrumentation Laboratory	PEC	4	1	0	6	0	3
28.	WRL-529	Design of Construction Job Facilities	PEC	4	3	1	0	3	0
29.	WRL-530	Construction Plant Machinery	PEC	4	3	1	0	3	0
30.	WRL-531	Air Conditioning and Ventilation	PEC	4	3	1	0	3	0
31.	WRL-532	Construction Techniques	PEC	4	3	1	0	3	0
32.	WRL-534	Soil and Agronomy	PEC	4	3	1	0	3	0
33.	WRL-535	Renewable Energy System Technology	PEC	4	3	1	0	3	0
34.	WRL-536	Water Quality Monitoring and Modeling	PEC	4	3	1	0	3	0
35.	WRL-537	Groundwater Development and Management	PEC	4	3	1	0	3	0
36.	WRL-538	Watershed Development and Management	PEC	4	3	1	0	3	0
37.	WRL-539	Remote Sensing and GIS Applications in Water Systems	PEC	4	3	0	2	3	0
38.	WRL-540	Sustainable Water Resources	PEC	4	3	1	0	3	0
39.	WRL-542	Ecohydrological Modeling and Sustainability	PEC	4	3	0	2	3	0

M.Tech. (Water Resources Development)/P.G. Diploma in Water Resources Development

Science, Technology, and Advanced Research-tools Basket

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	WRT-501	Artificial Intelligence (AI) & Machine Learning (ML) for Water Resources	STAR	3	2	0	2	3	0

Social Sciences Course Basket

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	WRS-501	Water and Society	SSC	2	2	0	0	3	0