

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

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

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
Program Core Courses (for CE/EE/ME 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-504	Applied Hydrology	PCC	3	2	0	2	3	0
4.	WRC-508	Hydromechanical and Electrical Equipment	PCC	3	2	0	2	3	0
5.		Program Elective-I	PEC	3	-	-	-	-	-
6.		Social Science Course	SSC	2	-	-	-	-	-
		<b>Total</b>		<b>19</b>					
Semester-II (Spring)									
1.		Program Elective-II	PEC	3	-	-	-	-	-
2.		Program Elective-III	PEC	3	-	-	-	-	-
3.		Program Elective-IV	PEC	3	-	-	-	-	-
4.		Program Elective-V	PEC	3	-	-	-	-	-
5.		Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-	-
6.	WRC-700	Seminar	SEM	2	1	0	2	-	-
		<b>Total</b>		<b>17</b>					
<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 36</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
<b>Semester-I (Autumn)</b>									
1.	WRC-691	Internship Social Activity	ISA	4	-	-	-	-	-
2.	WRC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		<b>Total</b>		<b>14</b>					
<b>Semester-II (Spring)</b>									
1.	WRC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		<b>Total</b>		<b>14</b>					

Summary				
Semester	1	2	3	4
<b>Semester-wise Total Credits</b>	19	17	14	14
<b>Total Credits</b>	<b>64</b>			

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**Program Elective Courses for Semester-I (Autumn)**

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	WRL-601	Open Channel Hydraulics	PEC	3	2	0	2	3	0
2.	WRL-602	Data Analytics for Water Resources	PEC	3	2	0	2	2	1
3.	WRL-603	Smart Irrigation Systems	PEC	3	2	0	2	2	1
4.	WRL-604	Environmental Impact Assessment of Water Resources Project	PEC	3	3	0	0	3	0
5.	WRL-605	Circular Water Economy	PEC	3	3	0	0	3	0

**Program Elective Courses for Semester-II (Spring)**

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	WRL-611	Assessment of Water Resources Project	PEC	3	1	0	4	1	2
2.	WRL-612	Underground Structures and Tunnels	PEC	3	2	1	0	3	0
3.	WRL-613	System Design Techniques	PEC	3	2	1	0	3	0
4.	WRL-614	Sediment Transport in Rivers	PEC	3	2	1	0	3	0
5.	WRL-615	Geotechnical Engineering	PEC	3	2	1	0	3	0
6.	WRL-616	Hydropower and Appurtenant Works	PEC	3	3	0	2	3	0
7.	WRL-617	Earth and Rockfill Dams	PEC	3	2	1	0	3	0
8.	WRL-618	Masonry and Concrete Dams	PEC	3	2	1	0	3	0
9.	WRL-619	Irrigation Structures	PEC	3	2	1	0	3	0

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**Program Elective Courses for Semester-II (Spring)**

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
10.	WRL-620	River Engineering	PEC	3	2	0	2	3	0
11.	WRL-621	Finite Element Methods	PEC	3	2	1	0	3	0
12.	WRL-622	Water Resources System Reliability	PEC	3	2	1	0	3	0
13.	WRL-623	Groundwater Hydrology	PEC	3	2	1	0	3	0
14.	WRL-624	Climate Change and Water Resources	PEC	3	2	1	0	3	0
15.	WRL-625	Substation and Transmission Line Design	PEC	3	2	1	0	3	0
16.	WRL-626	Installation Maintenance and Testing of Hydro Generating Equipment	PEC	3	2	1	0	3	0
17.	WRL-627	Maintenance Management in Power Plants	PEC	3	2	1	0	3	0
18.	WRL-628	Power System Management	PEC	3	2	1	0	3	0
19.	WRL-629	Electrical Design of Hydro Power Station	PEC	3	2	1	0	3	0
20.	WRL-630	Power System Operation and Control	PEC	3	2	1	0	3	0
21.	WRL-631	Control and Instrumentation of Hydro Power Plant	PEC	3	2	1	0	3	0
22.	WRL-632	Power System Analysis	PEC	3	2	1	0	3	0
23.	WRL-633	Power Systems Reliability	PEC	3	2	1	0	3	0
24.	WRL-634	Insulating Systems	PEC	3	2	1	0	3	0
25.	WRL-635	Planning and Design of Small Hydro Power Schemes	PEC	3	2	1	0	3	0
26.	WRL-636	Power Electronics Controlled Hydro-Electric Systems	PEC	3	2	1	0	3	0
27.	WRL-637	Modelling and Simulation of Hydro-Electric Energy Systems	PEC	3	1	0	4	2	2
28.	WRL-638	Synchronous and Asynchronous Generators Laboratory	PEC	3	1	0	4	0	3
29.	WRL-639	Power Electronics Laboratory	PEC	3	1	0	4	0	3
30.	WRL-640	Control and Instrumentation Laboratory	PEC	3	1	0	4	0	3
31.	WRL-641	Design of Construction Job Facilities	PEC	3	2	1	0	3	0

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**Program Elective Courses for Semester-II (Spring)**

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
32.	WRL-642	Construction Plant Machinery	PEC	3	2	1	0	3	0
33.	WRL-643	Air Conditioning and Ventilation	PEC	3	2	1	0	3	0
34.	WRL-644	Construction Techniques	PEC	3	2	1	0	3	0
35.	WRL-645	Soil and Agronomy	PEC	3	2	1	0	3	0
36.	WRL-646	Renewable Energy System Technology	PEC	3	2	1	0	3	0
37.	WRL-647	Water Quality Monitoring and Modeling	PEC	3	2	1	0	3	0
38.	WRL-648	Groundwater Development and Management	PEC	3	2	1	0	3	0
39.	WRL-649	Watershed Development and Management	PEC	3	2	1	0	3	0
40.	WRL-650	Remote Sensing and GIS Applications in Water Systems	PEC	3	2	0	2	3	0
41.	WRL-651	Sustainable Water Resources	PEC	3	2	1	0	3	0
42.	WRL-652	Ecohydrological Modeling and Sustainability	PEC	3	2	0	2	3	0
43.	WRL-653	Project Planning and Management	PEC	3	2	0	2	3	0
44.	WRL-654	Hybrid Renewable Energy System	PEC	3	2	0	2	3	0
45.	WRL-655	Rural and Urban Water Supply	PEC	3	2	0	2	3	0

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**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	2	1
2.	WRT-502	Automation in Water Resources Management	STAR	3	2	0	2	2	1

**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	2	0
2.	WRS-502	Policy and Strategies for DRR, Adaptation, Safety and Sustainability	SSC	2	2	0	0	2	0