

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

Program Code: **44 M.Tech. (Water Resources Development)**  
 Department: **WR WATER RESOURCES DEVELOPMENT AND MANAGEMENT**  
 Year: **I**

Teaching Scheme					Contact Hours/Week			Exam Duration		Relative Weight (%)				
S. No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWS	PRS	MTE	ETE	PRE
<b>Semester- I (Autumn)</b>														
1.	WRN-501	System Design Techniques	PCC	4	3	1	0	3	-	25	-	25	50	-
2.		Program Core Course 1	PCC	4	3	1	0	3	-	25	-	25	50	-
3.		Program Core Course 2	PCC	4	3	1	0	3	-	25	-	25	50	-
4.		Program Core Course 3	PCC	4	3	1	0	3	-	25	-	25	50	-
5.		Program Elective Course	PEC	4	-	-	-	-	-	-	-	-	-	-
		Total		20	12	4	-							
<b>Semester-II (Spring)</b>														
1.	WRN-505	Preparation of Water Resources Project Report	PCC	2	-	-	4	-	-	-	50	-	-	50
2.	WRN-700	Seminar	SEM	2	-	-	-	-	-	-	-	100	-	-
3.		Program Elective Course	PEC	4	3	1	-	3	-	25	-	25	50	-
4.		Program Elective Course	PEC	4	3	1	-	3	-	25	-	25	50	-
5.		Program Elective Course	PEC	4										
6.		Program Elective Course	PEC	4										
		Total		20	-	-	4							

Note: P.G. Diploma course in WRD shall be of ONE YEAR duration comprising of semesters I and II only, with a minimum credits of 40

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 Year: **II**

Teaching Scheme					Contact Hours/Week			Exam Duration		Relative Weight (%)				
S. No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWS	PRS	MTE	ETE	PRE
<b>Semester- I (Autumn)</b>														
1.	WRN-701A	Dissertation Stage-I (to be continued next semester)	DIS	12	-	-	-	-	-	-	-	-	100	-
		Total		12										
<b>Note: Students can take 1 or 2 audit courses as advised by the supervisor, if required.</b>														
<b>Semester-II (Spring)</b>														
1.	WRN-701B	Dissertation Stage-II (contd. From III semester)	DIS	18	-	-	-	-	-	-	-	-	100	-
		Total		18										

<b>Summary</b>					
Semester		1	2	3	4
<b>Semester-wise Total Credits</b>		<b>20</b>	<b>20</b>	<b>12</b>	<b>18</b>
<b>Total Credits</b>		<b>70</b>			

**PROGRAMME CORE SUBJECTS (WRD)**

Teaching Scheme					Contact Hours/Week			Exam Duration		Relative Weight (%)				
S. No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWS	PRS	MTE	ETE	PRE
<b>For Civil Background</b>														
1.	WRN-502	Design of Water Resources Structures	PCC	4	3	1	0	3	-	25	-	25	50	-
2.	WRN-503	Water Resources Planning and Management	PCC	4	3	1	0	3	-	25	-	25	50	-
3.	WRN-504	Applied Hydrology	PCC	4	3	1	0	3	-	25	-	25	50	-
<b>For Electrical Background</b>														
4.	WRN-531	Hydro Generating Equipment	PCC	4	3	1	0	3	-	25	-	25	50	
5.	WRN-532	Hydropower System Planning	PCC	4	3	1	0	3	-	25	-	25	50	
6.	WRN-533	Power System Protection Application	PCC	4	3	1	0	3	-	25	-	25	50	
<b>For Mechanical Background</b>														
7.	WRN-532	Hydropower System Planning	PCC	4	3	1	0	3	-	25	-	25	50	
8.	WRN-551	Design of Hydro Mechanical Equipment	PCC	4	3	1	0	3	-	25	-	25	50	
9.	WRN-552	Construction Planning and Management	PCC	4	3	1	0	3	-	25	-	25	50	

**PROGRAMME ELECTIVES COURSE (WRD)**

Teaching Scheme					Contact Hours/Week			Exam Duration		Relative Weight (%)				
S. No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWS	PRS	MTE	ETE	PRE
1.	WRN-511	Geotechnical Engineering	PEC	4	3	1	0	3	-	25	-	25	50	-
2.	WRN-512	Hydropower and Appurtenant Works	PEC	4	3	1	0	3	-	25	-	25	50	-
3.	WRN-513	Earth and Rockfill Dams	PEC	4	3	1	0	3	-	25	-	25	50	-
4.	WRN-514	Masonry and Concrete Dams	PEC	4	3	1	0	3	-	25	-	25	50	-
5.	WRN-515	Irrigation Structures	PEC	4	3	1	0	3	-	25	-	25	50	-
6.	WRN-516	Rural and Urban Water Supply	PEC	4	3	1	0	3	-	25	-	25	50	-
7.	WRN-517	River Engineering	PEC	4	3	1	0	3	-	25	-	25	50	-
8.	WRN-518	Finite Element Methods	PEC	4	3	1	0	3	-	25	-	25	50	-
9.	WRN-519	Water Resources System Reliability	PEC	4	3	1	0	3	-	25	-	25	50	-
10.	WRN-520	Environmental Impact Assessment of Water Resource Projects	PEC	4	3	1	0	3	-	25	-	25	50	-
11.	WRN-521	Groundwater Hydrology	PEC	4	3	1	0	3	-	25	-	25	50	-
12.	WRN-522	Climate Change and Water Resources	PEC	4	3	1	0	3	-	25	-	25	50	-
13.	WRN-534	Substation and Transmission line Design	PEC	4	3	1	0	3	-	25	-	25	50	-
14.	WRN-535	Installation Maintenance and Testing of Hydro Generating Equipment	PEC	4	3	1	0	3	-	25	-	25	50	-
15.	WRN-536	Maintenance Management in Power Plants	PEC	4	3	1	0	3	-	25	-	25	50	-
16.	WRN-537	Power System Management	PEC	4	3	1	0	3	-	25	-	25	50	-
17.	WRN-538	Electrical Design of Hydro Power Station	PEC	4	3	1	0	3	-	25	-	25	50	-
18.	WRN-539	Power System Operation and Control	PEC	4	3	1	0	3	-	25	-	25	50	-
19.	WRN-540	Control and Instrumentation of Hydro Power Plant	PEC	4	3	1	0	3	-	25	-	25	50	-

20.	WRN-541	Power System Analysis	PEC	4	3	1	0	3	-	25	-	25	50	-
21.	WRN-542	Power System Reliability	PEC	4	3	1	0	3	-	25	-	25	50	-
22.	WRN-543	Insulating Systems	PEC	4	3	1	0	3	-	25	-	25	50	-
23.	WRN-544	Planning and Design of Small Hydro Power Schemes	PEC	4	3	1	0	3	-	25	-	25	50	-
24.	WRN-545	Power Electronics Controlled Hydro-Electric Systems	PEC	4	3	1	0	3	-	25	-	25	50	-
25.	WRN-546	Modelling and Simulation of Hydro-Electric Energy Systems	PEC	4	1	1	4	2	2	15	25	20	40	-
26.	WRN-547	Synchronous and Asynchronous Generators Laboratory	PEC	4	1	0	6	-	3	-	50	-	-	50
27.	WRN-548	Power Electronics Laboratory	PEC	4	1	0	6	-	3	-	50	-	-	50
28.	WRN-549	Control and Instrumentation Laboratory	PEC	4	1	0	6	-	3	-	50	-	-	50
29.	WRN-553	Design of Construction Job Facilities	PEC	4	3	1	0	3	-	25	-	25	50	-
30.	WRN-554	Construction Plant Machinery	PEC	4	3	1	0	3	-	25	-	25	50	-
31.	WRN-555	Air Conditioning and Ventilation	PEC	4	3	1	0	3	-	25	-	25	50	-
32.	WRN-556	Construction Techniques	PEC	4	3	1	0	3	-	25	-	25	50	-
33.	WRN-571	Design of Irrigation Structures and Drainage Works	PEC	4	3	1	0	3	-	25	-	25	50	-
34.	WRN-572	Soil and Agronomy	PCC	4	3	1	0	3	-	25	-	25	50	-
35.	WRN-580	Renewable Energy System Technology	PEC	4	3	1	0	3	-	25	-	25	50	-
36.	WRN-581	Water Quality Monitoring and Modeling	PEC	4	3	1	0	3	-	25	-	25	50	-
37.	WRN-583	Remote Sensing and GIS Applications in Agriculture	PEC	4	3	1	0	3	-	25	-	25	50	-
38.	WRN-586	Groundwater Development and Management	PEC	4	3	1	0	3	-	25	-	25	50	-
39.	WRN-587	Watershed Development and Management	PEC	4	3	1	0	3	-	25	-	25	50	-