



Shri Rawatpura Sarkar University, Raipur, Chhattisgarh

Faculty of Engineering

Shri Rawatpura Sarkar University, Raipur



Examination Scheme & Syllabus

for

M.Tech.(Water Resource Engineering)

Semester-III

**Outcome Based Education (OBE) and Choice Based Credit System
(CBCS)**

(Effective from the Session: 2022-23)



Shri Rawatpura Sarkar University, Raipur, Chhattisgarh

Faculty of Engineering

Two Years M.Tech. Programme

Scheme of Teaching and Examination

M.Tech. Third Semester Water Resource Engineering

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2022-2023)

S.No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			Sem End Exam Duration (Hrs)
			L	T	P		Continuous Evaluation	Sem End Exam	Total	
1	MENWR301T	Irrigation & Drainage Engineering	3	1	-	4	30	70	100	3
2	MENWR302T	Elective-III	3	1	-	4	30	70	100	3
3	MENWR303P	Technical Paper Writing And Seminar	-	-	4	2	100	-	100	-
4	MENWR304P	Pre-dissertation (Literature Review/ Problem Formulation/ Synopsis)	-	-	20	10	140	60	200	-
Total Contact Hr Per Week: 32			Total Credit: 20			Grand Total Marks:			500	

L: Lecture T: Tutorial P: Practical

Elective-III

S.NO.	Subject Name	Subject Code
1	Design of Water Supply And Sewerage Systems	MENWR302A
2	Finite Element Method	MENWR302B
3	River Engineering	MENWR302C



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Course Title	Irrigation & Drainage Engineering				
Course Code	MENWR301T				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Water Resource Engineering-I & II				
Course Objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Take up the basic concepts of irrigation and construction of various hydraulic structures. • Introduce students to basic concepts of water, plants, their interactions, as well as irrigation and drainage systems design, planning and management. 				
Course Contents	<p>UNIT-I Crop water requirements, irrigation scheduling, flow and lift irrigation</p> <p>UNIT-II Water application methods, design of surface, sprinkler & drip irrigation systems.</p> <p>UNIT-III Principles of drainage system, types of drainage, design of surface and subsurface drainage</p> <p>UNIT-IV water logging and salinity control</p> <p>UNIT-V Design of lined and unlined canals, diversion headwork's.</p>				
Course Outcomes	<p>After the completion of course:</p> <ul style="list-style-type: none"> • The structures involved the elementary hydraulic design of different structures and the concepts of maintenance shall also form part. • Develop analytical skills relevant to the areas mentioned above, particularly the design of irrigation and drainage projects 				
Text Books	<ol style="list-style-type: none"> 1. Irrigation and Water Resources Engineering- G.L. Asawa, New age international Publisher. 2. Irrigation theory and practices - A.M. Michael, Vikas Publishing House Pvt Limited. 3. Irrigation system design – An Engineering Approach: Richard H Cuenca, Prentice Hall. 				
Reference Books	<ol style="list-style-type: none"> 1. Hand book of Irrigation Technology- H.J. Finkel, Vol.I. 2. Irrigation Structures Vol.I, - IR.S Vashney, Nem Chand & Brothers. 				



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Course Title	Design of Water Supply And Sewerage Systems				
Course Code	MENWR302T (Elective-III)				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Water Resource Engineering-I&II				
Course Objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Impart students with strong knowledge base through theory courses and sessional that makes them suitable for industries, academics, research and consultancies. • Develop students analytical, computational and research skills through assignments, weekly presentations and modeling software. • Train the students on developing practical, efficient and cost effective solutions on problems and challenges on environmental sciences and engineering. • Inculcate among students sensitivity towards social and corporate responsibilities. 				
Course Contents	<p>UNIT-I Water quality standards, Planning, analysis and design of water distribution systems.</p> <p>UNIT-II Basic concepts of water treatment, Conventional treatment processes, Design of water treatment units</p> <p>UNIT-III Characteristics of municipal waste water</p> <p>UNIT-IV Wastewater collection and conveyance systems, Design of sewers</p> <p>UNIT-V Design of municipal wastewater treatment systems</p>				
Course Outcomes	<p>After the completion of course:</p> <ul style="list-style-type: none"> • Develop environmental scientists and engineers and sensitize them towards environmental issues. • Acquire analytical skills in assessing environmental impacts through a multidisciplinary approach. • Identify environmental problems and solutions through organized research. • Improve the communication and writing skill so as to face the competitive world 				



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Text Books	<ol style="list-style-type: none">1. Pavement Management System' by Ralph Haas and Ronald W. Hudson, McGraw Hill Book Co. 19782. Modern Pavement Management by Haas, R.W.R.Hidson and J.P.Zaniewski. Krieger Publishing Company. Malabar, Florida, 1994.
Reference Books	<ol style="list-style-type: none">1. Infrastructure Management: Integrating Design, Construction, Maintenance, Rehabilitation, and Renovation by Hudson, W. R., R. Haas and W. Uddin McGraw Hill, Newyork, 1997.2. Proceedings of North American Conference on Managing Pavement3. Proceedings of International Conference on Structural Design of Asphalt Pavements NCHRP, TRR and TRB Special Reports.4. Pavement Analysis and Design by Huang, Yang H. Prentice-Hall, Inc Englewood Cliffs, New Jersey 1993



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Course Title	Finite Element Method				
Course Code	MENWR302T (Elective-III)				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Water Resource Engineering-I & II				
Course Objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Provide the fundamental concepts of the theory of the finite element method; • Develop proficiency in the application of the finite element method (modeling, analysis, and interpretation of results) to realistic engineering problems through • Use of a major commercial general-purpose finite element code. 				
Course Contents	<p>UNIT-I Basic concepts of mathematical models and numerical simulation, Initial and boundary value problems</p> <p>UNIT-II classification of partial differential equations, flow governing equations applied to water resources, features and steps of FEM analysis</p> <p>UNIT-III weak formulation, Ritz method, weighted residual methods, discretisation of domain, coordinate systems, interpolation functions</p> <p>UNIT-IV element matrix, assembly of element matrices, application of boundary conditions, solution of algebraic equations, numerical integration, parametric formulations, serendipity elements</p> <p>UNIT-V Jacobian, application of FEM to simple discrete system and continuous domain problems of water resources</p>				
Course Outcomes	<p>After the completion of course:</p> <ul style="list-style-type: none"> • Obtain an understanding of the fundamental theory of the FEA method; • Develop the ability to generate the governing FE equations for systems governed by partial differential equations; • Understand the use of the basic finite elements for structural applications using truss, beam, frame, and plane elements; and • Understand the application and use of the FE method for heat transfer 				



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	problems
Text Books	<ol style="list-style-type: none">1. An Introduction to the Finite Element Method- Reddy J.N., McGraw-Hill.2. Finite Element Analysis- Theory and Programming- C.S. Krishnamoorthy, Tata McGraw-Hill Education.
Reference Books	<ol style="list-style-type: none">1. Finite Element Handbook-H. Kardestuncer



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Course Title	River Engineering				
Course Code	MENWR302T (Elective-III)				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Water Resource Engineering-I&II				
Course Objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Various components of hydrologic cycle that affect the movement of water in the earth • Various Stream flow measurements technique • Concepts of movement of ground water beneath the earth • Basic requirements of irrigation and various irrigation techniques, requirements of the crops 				
Course Contents	<p>UNIT-I River morphology, Plan form variations and river channel pattern, Characteristics of braided and meandering rivers</p> <p>UNIT-II River dynamics, River gauging, Sediment transport in rivers, Bed load and suspended load transport for uniform and non-uniform bed material</p> <p>UNIT-III Total load equations, sediment sampling, Reservoir planning, Reservoir sedimentation, River training works</p> <p>UNIT-IV Principles of stabilization and rectification of rivers, River bank stability analysis</p> <p>UNIT-V Design of river training works like groynes, guide banks, gabions, Hydraulic modelling of rivers</p>				
Course Outcomes	<p>After the completion of course:</p> <ul style="list-style-type: none"> • Distribution systems for canal irrigation and the basics of design of unlined and lined irrigation canals design • Basic components of river Training works. • Apply math, science, and technology in the field of water resource Engineering. 				
Text Books	<ol style="list-style-type: none"> 1. Garde, R.J., (2006), "River Morphology", New Age International Publishers 2. Garde, R.J. and Ranga Raju, K.G., (2006), "Mechanics of Sediment 				



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	Transportation and Alluvial Stream Problems", Wiley Eastern Limited
Reference Books	<ol style="list-style-type: none">1. Julien, Pierre, Y., (2002), "River Mechanics", Cambridge University Press2. Jansen, P.P.H., (1994), "Principals of River Engineering", VSSD Publications



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Course Title	Technical Paper Writing And Seminar				
Course Code	MENWR303P				
Course Credits	L	T	P	TC	
	-	-	4	2	
Prerequisites	Nil				
Course Objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Describe the research process. • Outline the elements of a thesis/dissertation. • Select a research topic of importance to the profession. • Effectively work with their academic advisor and graduate committee. • Develop and follow an appropriate timeline for completion of the thesis/dissertation. • Identify an appropriate theory base for their research. • Develop a conceptual model relevant to their research. 				
Course Contents	<ul style="list-style-type: none"> • Each student will select a topic in the area of Transportation engineering and related area in the state of art area & technical development. • The topic will be decided by the Student, Guide and Departmental research committee. • Each student will make seminar presentation with audio/video aids, for the duration of 45 minutes and seminar work shall be in form of report to be submitted by the students at the end of the semester. • This report copies must be duly signed by guide and Head of Department. Attendance of all students for all seminars is compulsory. • Define the statement of research problem • Literature survey, familiarity with research journals • Broad knowledge off the available techniques to solve the problems • Technical writing skills • Presentation skills 				
Course Outcomes	<p>After the completion of course:</p> <ul style="list-style-type: none"> • Acceptable with minor or no revisions (no further approval required) • Acceptable with major revisions in content or format not acceptable 				



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Reference Books	<ol style="list-style-type: none">1. Student will learn to survey the relevant literature such as books, national/international referred journals and contact resource persons for the selected topic of research.2. Roberts, C. M. (2010). The dissertation journey. Thousand Oaks, CA: Corwin.
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Course Title	Pre-Dissertation (Literature Review/ Problem Formulation/ Synopsis)				
Course Code	MENWR304P				
Course Credits	L	T	P	TC	
	-	-	20	10	
Prerequisites	Nil				
Course Objectives	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Demonstrate the skills for good presentation and technical report writing skills. • Apply engineering and management principles while executing the project. 				
Course Contents	<ul style="list-style-type: none"> • Each student will select a topic in the area of Transportation engineering and related area in the state of art area & technical development. • Every student will carry out dissertation under the supervision of a Supervisor. • The topic shall be approved by a committee constituted by the Head of the concerned department. • Every student will be required to present two seminar talks, First at the beginning of the Dissertation (Phase-I)to present the scope of the work and to finalize the topic, and second towards the end of the semester, presenting the work carried out by him/her in the semester. • The committee constituted will screen both the presentations and work. • Define the statement of research problem • Literature survey, familiarity with research journals • Broad knowledge off the available techniques to solve the problems • Technical writing skills • Presentation skills 				
Course Outcomes	<p>After the completion of course:</p> <ul style="list-style-type: none"> • Student will learn to survey the relevant literature such as books, national/international referred journals and contact resource persons for the selected topic of research. • Students will be able to use different experimental techniques. • Students will be able to use different software/computational/analytical tools. • Students will be able to design and develop an experimental set up/equipment/test rig. • Students will be able to conduct tests on existing set ups/equipments and draw 				



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	<p>logical conclusions from the results after analyzing them.</p> <ul style="list-style-type: none">• Students will be able to either work in a research environment or in an industrial environment.
Reference Books	<ol style="list-style-type: none">1. Student will learn to survey the relevant literature such as books, national/international referred journals and contact resource persons for the selected topic of research.2. Roberts, C. M. (2010). The dissertation journey. Thousand Oaks, CA: Corwin.