

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

SUB CAMPUS, OSMANABAD

DEPARTMENT OF WATER AND LAND MANAGEMENT

FINAL SYLLABUS: MMS (WATER & LAND MANAGEMENT) 2016-2017

SR.NO.	SUBJECT CODE	TITLE OF THE SUBJECT	COURSE CREDIT	MARKS	NATURE
SEMESTER - I					
1	WLM-111	WATER & LAND RESOURCES DEVELOPMENT AND UTILIZATION	4	100	CORE
2	WLM-112	SURVEY, LEVELING AND MAPPING	4+2	150	CORE
3	WLM-113	SOIL SCIENCE IN RELATION TO WATER AND PLANT	4+2	150	CORE
4	WLM-114	CONSTITUTION OF INDIA	2	50	FOUNDATION
ELECTIVE-I					
5	WLM-115	HYDRAULICS	4	100	ELECTIVE
5	WLM-116	COMPUTATIONAL TECHNIQUES	4	100	ELECTIVE
TOTAL CREDITS			22		
SEMESTER - II					
6	WLM-121	HYDROLOGY	4+2	150	CORE
7	WLM-122	ADVANCE TECHNIQUES IN WATER APPLICATION	4+2	150	CORE
8	WLM-123	AGRICULTURAL ENTREPRENEURSHIP	4	100	CORE
9	WLM-124	LEGAL ASPECTS OF WATER RESOURCES DEVELOPEMWT	4	100	CORE
10	WLM-125	RESEARCH METHODOLOGY-I	0+2	50	FOUNDATION
ELECTIVE-II					
11	WLM-126	WATER CONVEYANCE AND DISTRIBUTION SYSTEM	4	100	ELECTIVE
11	WLM-127	FINANCIAL MANAGEMENT	4	100	ELECTIVE
TOTAL CREDITS			26		

SEMESTER -III					
12	WLM-231	INTEGRATED WATERSHED MANAGEMENT	4+2	150	CORE
13	WLM-232	MANAGEMENT OF IRRIGATED PLANTS	4+2	150	CORE
14	WLM-233	MANAGEMENT SKILLS	4	100	CORE
15	WLM-234	RESEARCH METHODOLOGY-II	0+6	100	CORE
16	WLM- 235	SERVICE COURSE(INTEGRATED WATER RESOURCES MANAGEMENT)	4	100	CORE
17	WLM- 236	SEMINAR	4	100	FOUNDATION
ELECTIVE-III					
18	WLM-237	APPLICATION OF INFORMATION TECHNOLOGY IN WATER MANAGEMENT	4+2	150	ELECTIVE
18	WLM-238	OPTIMIZATION TECHNIQUES	4+2	150	ELECTIVE
TOTAL CREDITS			36		
SEMESTER -IV					
19	WLM-241	GROUND WATER MANAGEMENT	4+2	150	CORE
20	WLM-242	MANAGERIAL PERSPECTIVES	4	100	CORE
21	WLM-243	RESEARCH METHODOLOGY-III (DISSERTATION)	0+8	200	CORE
ELECTIVE -IV					
22	WLM-244	DRINKING WATER MANAGEMENT	4+2	150	ELECTIVE
22	WLM-245	ENVIRONMENTAL ASPECTS OF WATER RESOURCES DEVELOPMENT	4+2	150	ELECTIVE
TOTAL CREDITS			24		
TOTAL COURSE CREDITS			22+26+36+24= 108		

SCHOOL SYSTEM SYLLABUS

Master of Management Science (Water & Land Management)

SEMESTER I

WLM -111
WATER & LAND RESOURCES DEVELOPMENT AND UTILIZATION
SECTION- A

1. Agro climatic zones of India and Maharashtra, Importance of Agro regionalization.
2. Water wealth availability, Statistics, surface and ground water resources,
3. Definition of soils, types of soil, soil fertility, soil productivity, Land occurrence and their present status, drought, types of droughts, effects of droughts.
4. Brief history of water resources development
 - A) Indian
 - B) Global
5. Present Status of surface rivers & Dams in Maharashtra, ground water of Maharashtra
6. Variability of natural resources [Part-I & Part-II]
Part-I Chak Planning, Field Channel & Structures on it
Part-II Land smoothening, Land Grading & Land Leveling & Implements used

&
SECTION- B

- 1) Traditional schemes: Practices of Water Resources Development & utilization
 - A. Kautilian management of Community Water Development & Utilization, Sholakes on water indicators.
 - B. Location of Ground Water: Biotic Approach of Environment Management in general & Water Management in Particular
- 2) Types of schemes: Modern Concepts, classification of irrigation projects.
 - A. Storage Schemes - Types of dams & their components, their allocation, Operation & Maintenance of storage schemes- Monitoring & Evaluation
 - B. Diversion Schemes- Purpose, Types, Suitability, Operation & Maintenance Monitoring & Evaluation

Readings:

1. Irrigation theory & practices by A. M. Michael
2. Water Supply & Sanitary Engineering by S. C. Rangwala
3. Water Power Engineering by Santoshkumar Garg
4. परम वैभवाचा टप्पा- प्रा. रमेश पांडव
5. Agronomy- J. Shay
6. WALMI- Pub. No. 1.
7. WALMI- Pub. No. 36.
8. Social & organizational aspects of irrigation management, WALMI Aurangabad Pub. No. 52.
9. Education & Communications for development by Danama & Bhatnagar, Oxford & IBH Pub. New Delhi.
10. Rural Sociology by Desai A.R.
11. Blue Revolution by Dr. Madhavrao Chitale
12. C.W.C.-Corrigendum on Water Statistics
13. Operation & Management of Irrigation systems in Maharashtra, WALMI Aurangabad pub. No. 20
14. Water Distribution Practices in Maharashtra, WALMI, Aurangabad pub. No. 22
15. Kautilya Arthashashtra – by Dr. Kangle
16. Kautiliya Arthashashtra – Sarota Prakashan
17. Chap. 3 to 6 of Bruhatsamhita - by Varahmihir **

WLM- 112

SURVEY, LEVELING AND MAPPING

1. Chain & ranging: Classification and Principles of surveying, Precision in surveying, chain and tape, Direct and indirect ranging, chaining a line, Errors in chaining, Tape correction Offsets, Cross staff survey,
2. Compass Traversing: Prismatic and Surveyor's compass. Meridians, True, Magnetic and Arbitrary bearings, Fore and back bearing, calculations of angles from bearings and bearings for angles. Local attraction and correction of bearings. Traversing with the chain and compass, Graphical method of compass traverse adjustment.
3. Leveling: Dumpy level, Auto level, Temporary and Permanent adjustment, Bench Marks, Reduction of levels, Profile leveling, Reciprocal leveling, check leveling, Plotting of profiles, Contouring, Characteristic of contour lines and their use, Method of contouring, interpolation of contours.
4. Plane Table Survey: Accessories and adjustments of plane table, Methods of plane tabling and their suitability, Storage.
5. Theodolite: Construction, Temporary and permanent adjustments,
6. Measurements of horizontal angles and vertical angles by various methods.
7. Remote sensing: Introduction, applications in water and land management and color code, Indian satellite data.

&

Practical

1. Scale, Symbols on maps; plan elevation, isometric view.
2. Measurement of land slopes, river gradients.
3. Computation of Areas and Earth Work: Planimeter-Theory and use, Area of cross sections for level, two level, three level, side hill two level and multilevel section, Prismoidal and trapezoidal formula for volume calculations, Prismoidal correction, volume of cut and fills, haulage and lifts, mass diagrams for economic grade line.
4. Presentation of climatic data on maps.
5. Drawing of contour maps.

Readings:

1. Surveying and leveling Vol. I & II by Prof. T.P. Kanetkar & Prof. S.V. Kulkarni.
2. Surveying Vol. I & II by Dr. B.C. Punmia., Laxmi Publications Pvt. Ltd. New Delhi.
3. Surveying and leveling by Basak
4. Remote Sensing by Kiefer

WLM- 113

SOIL SCIENCE IN RELATION TO WATER AND PLANT

Section-A

1. Soil & its formation
2. Infiltration characteristics and its measurement
3. Physical & Chemical characteristics of soil
4. Soil Survey techniques, Soil profile description, Soil irrigability classification, soils of Maharashtra, Problematic Soils.
5. Soil testing and fertility

Section -B

1. Agro. Meteorology,
2. Evapotranspiration and its computation,
3. Root systems of plants
4. Soil moisture constants, Water holding capacity of soil, available water submergence/drought /salt tolerance of crops,
5. Crop water requirements, irrigation scheduling
6. Crop yield response to water, crop water use efficiency.

Readings:

1. Fundamentals of soil science published by Audition society of soil science. I.A.R.I. New Delhi. 110012.
2. Soil resources mapping of India by J.L. Sehgal (1991) NBSS & LUS Bulletin No. 25, Nagpur.
3. Second Maharashtra Water & Irrigation Commission-1999.
4. Crop water requirement, FAO, I & D, Pub. No.24 (Doorenbos & Pruitt)
5. Crop yield response to water, FAO I & D, Pub. No.33
6. Soil water, Hillel D. Academic Press Inc. New York.
7. Application of soil survey in irrigation management, WALMI Aurangabad pub. No. 21 Special course on D.A. of minor irrigation schemes, WALMI Aurangabad pub. No. 11

IC 001
CONSTITUTION OF INDIA

WLM- 115

RESEARCH METHODOLOGY-I

1. Introduction: Meaning of Research, Types of Research, Research & scientific methods with references to water & Land Management & Agricultural & Marketing.
2. Defining the research problems, Identification of Research problems, Technique involved in defining the problems
3. Research design: Meaning and need of research design, features of a good design, important concepts relating to research design.
4. Sampling designing, Census and sample survey, steps in sample design, Different types of sample designs.
5. Testing of hypothesis.

WLM- 115
HYDRAULICS

1. Hydraulics- Definition, Characteristics, Terminology, Device-Problems on That Q through devices, V-Notch flumes orifice weir, Energy Concept- Types of energy & Problems on energy.
2. Pipe flow- Concepts, friction loss- types of frictions losses, problems on friction loss, discharge calculation.
3. Water pressure-problems on water pressure.
4. Differentiate between closed conduits & open channel. Problems on open channel design- Darcy's equation, Manning's equation, Chezy's constant.

Experiments:

- 1) Measurement of flow characteristics
- 2) Measurement of static pressure

Readings:

1. Open Channel hydraulics by Ven. T. Chou.
2. Flow Measurement in irrigation canals WALMI, Aurangabad (Pub.No.36)
3. Flow through pipes by Sethi & Lal.

WLM- 116

COMPUTATIONAL TECHNIQUES

1. Units, Conversion of units, basic mathematics.
2. Trigonometric functions and ratio, Product, power, sum.
3. Collection of data, classification of data, measure of central tendency, measure of dispersion.
4. Sampling techniques, Data analysis, Co-relation, regression, Curve fitting, probability,
5. Classical optimization techniques and models, sensitivity analysis,
6. Data sources.

Readings:

1. Civil Engg. Handbook by Khanna
2. Mathematical Handbook by F. S. Merritt
3. Mathematical Handbook by M. Vygodsky.
4. Introduction to mathematics for life Sciences by E. Batschelet.
5. Elements of applied mathematics by P. N. Wartikar & J. N. Wartikar.
6. Mathematical models in Agriculture by J. France & JHM Thornley.
7. Innumeracy: Mathematical Illiteracy and Its Consequences by John Allen Paulos
8. Data Mining Techniques for Marketing, Sales and Customer Support by 'Berry & Linoff'
9. Data Warehousing, Data Mining and CLAP by Berson and Smith
10. Exploratory Data Analysis by John Tukey
11. Finding Statistics Online by Paula Berinstein
12. Cambridge Dictionary of Statistics by B.S. Everitt
13. Encyclopedia of Statistical Sciences edited by Samuel Kotz
14. WALMI Publication on Statistics.

Master of Management Science (Water & Land Management)

SEMESTER II

WLM- 121

HYDROLOGY

1. Hydrological cycle: - Definition, Importance of hydrology, branches of Hydrology, Hydrological cycle.
2. Precipitation: - Types & forms of precipitation, measurement of rainfall, methods of measurement of rainfall, types of rain gauges, Installation of rain gauge, rain gauge density.
3. Runoff: - Definition, Their types, factors affecting runoff, methods of estimation of runoff, climatic model, forecasting techniques.
4. Unites of Water Measurement: - Water resources of Maharashtra State, water measurement, unites of water measurement A] Static B] flowing, terminology related to water measurement.
5. Variability of Water Resources: - Water resources of state & country, Variability of water resources in State & Country.
6. Water Harvesting: - Definition, History of development, principles, classification, water harvesting techniques used in various state water storage planning.
7. Evaporation: - Evaporation losses from water bodies & surfaces, definition, instruments for measurement, factors affecting evaporation.
8. Hydrology of intercepted catchments different types of catchments, water availability indices.
9. Infiltration: - Definition, Terminology related to infiltration, measurement of infiltration, single cylinder infiltrometer, double cylinder infiltrometer, problems of infiltration.

Experiments:

1. Measurement of stationary water
2. Measurement of flowing water
3. Measurement of rainfall
4. Measurement of Infiltration

Readings:

1. Hydrology by R.S.Varshney, Roorkee.
2. Handbook of Applied Hydrology by Ven t. Chou.
3. Applied Hydrology by K.N. Mutreja.
4. Applied Hydrology by Linsleg, Kobler & Pauchus.
5. Hydrology by Raghunathan
6. Manual of Watershed Development works by Centre for Research in Dry land Agriculture, Hyderabad (CRIDA)
7. A Technical Manual on watershed development for NWDPRA Scheme, Ministry of Agriculture, Govt. of India.

WLM- 122

ADVANCE TECHNIQUES IN WATER APPLICATION

Objective: - The water conveyance and applications play significant role in Water and Land Resource Management. The knowledge of designing and setting advance irrigations techniques will help in the optimum water utilization.

1. Greenhouse Technology: Introduction, Types, merits, demerits Management of Greenhouse, Installation & Operation.
2. Drip Irrigation: Advantages, Introduction, Merits and Demerits, Types, Components, their types, planning & Design.
3. Sprinkler Irrigation: Introduction, Types, Merits & Demerits, and planning & Design. (Concepts & use of ready reckoners for selection & estimation)
4. Govt. Policies & incentives to promote Advance techniques in irrigation.

Readings:

1. Drip Irrigation by Holsambre D.G.
2. ICID handbooks
3. Drip Irrigations by Shivappan
4. Greenhouse Technology

WLM- 123

AGRICULTURAL ENTREPRENEURSHIP

1. Entrepreneurship: Definition, Concepts, and Types.
2. Trade concerns in Indian Agricultural due to worlds Trade Organization [WTO] and General Agreement on Tariffs and Trade [GATT]
3. Local, National and International Marketing, Role of Agricultural Produce Market Comities [APMC] and APEDA in marketing Agricultural Export opportunities and Standards and grades for including export and Standards, and grades for all type of marketing including exports.
4. Entrepreneurship: - setting of Business Unit, Management of resources, financial aspects, legal aspects.
5. Maharashtra Agro – Industries Development Corporation [MAIDC] and Maharashtra Industrial Development Corporation [MIDC]: Schemes and Subsidies, project report and procedural aspects for setting up small scale Agro based industries.

Reading:

1. Problems & prospects of Agriculture in India, Speeches of Buta Singh [1985] Publications and Information Division ICAR, Krishi Anusandhan Bhavan, New Delhi – 110 012.
2. Handbook of Agricultural Occupations by Norman K. Hoover ISBNO – 8134-2351-1, The Interstate Printers & Publishers, Inc. Danvill, Illinois.
3. Managerial Strategy for agricultural development in the early 21st Century by Dr. P. V. Sheno, NABARD, Department of Economic Analysis & Research 4th Floor, “C” wing Plot C – 24, G- Block, P.B. No. 8126. Bandra Kurla Complex, Bandra [East], Mumbai-400051.
4. Technological Transformation in Agriculture by Surendar Singh , Ariana Publisher House , EG – 132 , Inderpuri, New Delhi- 110 012.
5. The Hindu Survey of Indian Agricultural – 1996 Editor, N. Ravi National Press Kasturi Building – Chennai – 600 002.
6. Post WTO Era: Impact on export Prospects of live stock products, Occasional Paper – 32 Dr. S.P. Singh, NABARD.
7. Trade Concerns in Indian Agricultural: Indian forms & the WTO by Amir Ullah Khan, Pushier – Bazaar Cama Bhawan, New Delhi – 110 077.
8. NABARD Technical Disgest – 2002 [Issue 6]
9. NABARD Technical Disgest – 2003 [Issue 7]
10. कृषी संवदिनी २००६, विस्तार संचालनालय , डॉ. प. दे. कृ. वि. अकोला ४४४ १०४

WLM- 124

LEGAL ASPECT OF WATER RESOURCES DEVELOPMENT

1. Review of traditional Water Laws & Rules in View of Code of Conduct.
2. Provisions in the constitution, water rights, water laws of Maharashtra and other States.
3. National and State water Policies, Legal aspects of inter-basin transfer of water.
4. Participation of Farmer's & other water users in water management, water users Associations.
5. Laws related to Environmental protection, Health of soil, and Reuse of water

Readings:

1. Water laws by Jain
2. The Maharashtra Irrigation Act, 1976.
3. Maharashtra Management of irrigation systems by Farmers Act, 2005(MMISF Act. 2005)
4. Model irrigation Act, GOI.
5. MWRRA 2005 Maharashtra water resources regulatory Authority Act
6. Water Policy: State & India- 1987 & 2002

WLM- 125
RESEARCH METHODOLOGY-II

WLM-126

WATER CONVEYANCE AND DISTRIBUTION SYSTEM

1. Canal networks, piped networks, Tunnels, Aqueducts, Super passages
2. Water lifting
3. Historical development, traditional systems, pumps, energy requirements. Water application methods. Gravity Irrigation methods: Land forming for irrigation, border, basin and furrow methods; their management and irrigation efficiencies return flows, drainage.
4. Municipal and Industrial piped networks, elevated service reservoir
5. City effluents and their disposal.

Sessional Work:

1. Visit to complex water systems- Koyana & Bhakra
2. Experiments on chapter 3 & 4

Readings:

1. Dying wisdom, pub of Centre for Science & Environment, New Delhi.
2. History of Irrigation in Indus Basin, ICID, New Delhi.
3. History and practice of management of irrigation water in Maharashtra P.R Gandhi. WALMI. Aurangabad Pub. No. 1
4. National workshop on Phad system of irrigation. WALMI. Aurangabad Pub. No. 15
5. Irrigation- Theory & Practice by Dr. A.M. Michael.
6. Land & Water Management Engg. By VVN Murthy.
7. Integrated water management for crop production Shinde & Firke. WALMI. Aurangabad Pub. No. 22
8. Water distribution practices in Maharashtra. WALMI. Aurangabad Pub.No.22
9. Manual- On Farm Development works, Dept. of Water Resources, Govt of Maharashtra.

WLM- 127

FINANCIAL MANAGEMENT

1. Agricultural financing: concept, nature and significance. Institutional structure of agricultural finance in India, Multi –Agency approach to agricultural finance.
2. Role of Central and State governments in Agricultural finance: Promotion and Regulation; Budgetary support: Agriculture & Irrigation.
3. International Financing agencies: IMF, World Bank, UNESCO.
4. Modalities of financing: Individual, Group & Co-operative project financing, Loan Proposal preparation and Procedure of credit disbursement.
5. Basic Principles of accounting in agriculture, Management of Income flow & Expenditure.
6. Productivity of water, productivity of land under different patterns of use.

Readings: -

1. Indian Economy: R. Datt & K.P.M. Sundaram.
2. Rural Banking: S.M. Desai.
3. Monetary Economics (Institutions, Theory & Policy) by Suraj B. Gupta.
4. Financial Management: Dr. Varma M.M. & R.K. Agrawal.
5. International Financial Management By V.K. Bhalla.
6. NABARD and Rural Transformation: N. Lalitha & R. Dayanandan.
7. Directory of credit Facilities-AFARM.

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SEMESTER III

WLM- 231

INTEGRATED WATER RESOURCES MANAGEMENT

1. Concept of Watershed, types of watersheds, watershed development, concept of watershed management. Components of watershed management, principles of watershed management, objectives of watershed management, watershed planning
2. Watershed planning, steps in watershed planning scope of watershed planning.
3. Water Budgeting in watershed, soil and water conservation methods & structures [Water harvesting methods in reference to Rural Development],
4. Land capability classes, Plan; site preparation, suitability for various purposes such as plantation, forest. Irrigated agriculture, industry and grassland.
5. Agro forestry, Social Forestry and other agro – based development activities (animal husbandry, dairy, poultry, Biogas, Biological Composting, etc.)
6. Sustainability: Maintenance of watershed development works, peoples' participation, role of Government and Non-Government Organizations.
7. Drought management
8. Community Infrastructure in Watershed, participatory approach to watershed management
9. Project Proposal Preparation

Readings:

1. Watershed development, J. Narayanmurti.
2. National Watershed Development Project for Rain fed (NWDPRRA)
3. Guidelines; Ministry of Agriculture, GOI, New Delhi-1991
4. Soil & water conservation by Dr. Dhruvanarayan
5. Handbook by AFARM

WLM- 232

MANAGEMENT OF IRRIGATED PLANTS

1. Crops and their classification, cropping pattern, farming systems,
2. Agro. Technology: Tillage practices, Seed and sowing, manures and fertilizers and plant protection.
3. Irrigation water management of important agronomical crops, management of irrigated horticultural and forest crops, optimization of crop production.
4. Sustainable crop production and Organic farming,
5. Land development and land forming for irrigation,
6. Gravity Irrigation methods: Water application methods (border, basin and furrow method etc.) and their efficiencies.
7. Farm Machinery
8. Nursery Management
9. Greenhouse Technology: Introduction, Types, Merits & Demerits, Management of Greenhouse, Installation & Operation.

Readings:

1. Irrigated crops, WALMI, Aurangabad, Pub. No.44.
2. Agro Technology for irrigated agriculture, WALMI, Aurangabad, Pub. No.47.
3. A text book at soil science, by Dai-J-A, J.R. Kadam, N.D. Patil, Media promoters & publishers, Mumbai, 1999.
4. Advances in soil physics by Dakshinmurthy C, DCAR publication, New Delhi.
5. Soil science by Gbildalyal B.P. & R.P. Tripathi, Willey Eastern ltd. New Delhi.
6. Cropping systems in the tropics – Principles & Management, Palaniappar S.P. Wiley Eastern ltd. New Delhi.
7. Principles of Agronomy by T.Y. Reddy & G.H. Reddy, Kalyani Publishers, New Delhi.

Sessional works: Visit to minimum five irrigated farms to study the above syllabus.

WLM- 233
MANAGEMENT SKILLS

The content is divided in to five logical units.

- i) Managing people & Organizations,
- ii) Communication technology & interpersonal processes,
- iii) Leadership,
- iv) Group Dynamics and teams,
- v) Interactive conflict & negotiation Skills.

It is designed by keeping self in focus with a clear objective of developing Generic skills, to enhance the capabilities in the fields of searching assimilating and using information on job. Developing self and managing given tasks. Finally to present himself as a techno manager.

Detailed Contentment's:

UNIT-I Managing people & Organizations,

1. Managerial perspective on Organizational behaviour
2. Manager's Job,
3. Managerial Roles,
4. Managerial functions,
5. The human context of Management.

UNIT-II Communication technology & interpersonal processes,

6. Definition of communication
7. Communication technology,

UNIT-III Leadership,

8. Nature & Significance of Leadership,
9. Leadership traits & Skills,
10. Behavioural styles in Leadership,
11. The Roles & activities & Leadership,
12. Leadership Skills,

UNIT-IV Group Dynamics and teams,

13. The group dynamics & teams
14. The nature of Groups,
15. Dynamics of informal groups,
16. Dynamics of formal groups,
17. Teams in modern workplace,
18. The nature of teams, the effectiveness of teams,
19. Flow to make team more effective,

UINT-IV Interactive conflict & negotiation Skills

20. Intraindividual conflict,
21. Interpersonal conflict,
22. Intergroup Behavioural conflict,
23. Organizational conflict,
24. Negotiation Skills,

Readings:

1. Organizational Behaviour by Fred Luthans,
McGRAW-HILL, International Edition [7th Edition]
2. Organizational Behaviour by Gregory Moorhead and Ricky W. Griffin
[Jaico Publishing House]
3. Humal Relations & Organizational behaviour- A Global perspective by
R.S. Dvivedi [Macmillan India Limited 4th Edition]
4. Successful Communication for business- by Angolawadia
5. Effective business communication – Asha Kaul [H.R.D.]

WLM- 234
RESEARCH METHODOLOGY-II

WLM- 235

SERVICE COURSE (INTEGRATED WATER RESOURCES MANAGEMENT)

1. Water wealth Availability, statistics, surface & ground water resources
2. Hydrologic cycle, types of precipitation, Forms of Precipitation, Runoff, types of Runoff, factors affecting runoff, measurement of runoff, types of rainguages
3. Water measurement: - static & dynamic methods, formulae'
4. Vertical distribution of ground water, ground water regions in India, Methods of ground, water recharge, types of tube well.
5. Methods of irrigation, advanced techniques of irrigation, Advantages & Disadvantages components, Drip design.
6. Concept of watershed, types of watershed, components, principles & objectives of watershed management, steps in watershed planning.
7. Water Harvesting methods
8. Drinking water Management, purpose of water, demand & supply management'

WLM- 236

SEMINAR

WLM- 237

APPLICATION OF INFORMATION TECHNOLOGY IN WATER

MANAGEMENT

1. Computer hardware and software.
2. WINDOWS, MS Office, Internet.
3. Data management, use of application software for irrigation management, water requirement, pollution, water & health and water management.
4. Use of available software in water and land management.
5. VISUAL BASICS, MS Access (Data Base Package)

Session Work:

- (1) Using MS Excel, estimate the area under three crops which can be irrigated with the available water given net irrigation requirement of each crop, proportion of each crop and irrigation efficiency.
- (2) Establishing co-relation between rainfall & runoff using Regression Analysis tool in MS Excel.
- (3) Preparing 2-3 page reports in MS WORD which should include text, Data table and Graph.
- (4) Down loading 2-3 pages from the web site related to water and land management.

Readings:

1. Computing Essentials by T.J. O'Leary & Linda O'Leary, Tata Mc Graw Hill.
2. Using M.S Office by QUE Corporation.
3. Using Excel by QUE Corporation.
4. The Road Ahead by Bill Gates.
5. Using WORD 2000 by QUE Corporation.
6. WINDOWS 2000 Professional by Desmend Michael.
7. CROPWAT- A computer programme for irrigation planning and management, FAO irrigation and Drainage paper No.46 by Martin Smith.
8. Irrigation water delivery models, FAO Roure Water Reports No.2 Oct. 93.

WLM- 238
OPTIMIZATION TECHNIQUES

1. Nature and significations of O.T.
2. Linear programming, concepts & assumptions
 - i) Graphical method of solving L.P.
 - ii) Simplex method: Application of L.P. [Use of software packages]
3. Transportation Techniques. [NWCR], [MMM], [VAM], Basic feasible solution, Optimal solution
4. CPM & PERT: Critical path Method & Project Evaluation Review Technique. Concepts, objectives models and application
5. Inventory Models: Inventory Decisions & types of inventories
 - i) EOQ models (Economic Order Quantity Model)
 - ii) Inventory models with shortages
6. Sensitivity analysis

Readings:

1. Quantitative Techniques in Management by Vohra, Tata Mcgraw Hill
2. Operations Research by Goal, S.K Mittal
3. Operations Research by Chawla, Gupta, Sharma
4. Operations Research for Management by Shinony, Srivastava & Sharma
5. Operations Research & Statistical Analysis by P.K. Gupta & Manmohan
6. Production, Operation Management by B.S. Goal.
7. Economics, Theory & Operation, Analysis by Baumol
8. Introduction of Operations Research by Churchman Ackoff, Arnooff
9. Operations Research by Goal & Mittal

Master of Management Science (Water & Land Management)

SEMESTER IV

WLM- 241

GROUNDWATER MANAGEMENT

1. Geology of Maharashtra, Ground Water Regions in India.
2. Hydrogeology, Aquifers, groundwater, survey techniques, Ground Water, Survey Techniques, Transmissibility of water, water holding capacity of aquifers, dynamic components.
3. Conjunctive use of surface and groundwater, abstraction of groundwater, artificial recharge to groundwater, filtration techniques.
4. Groundwater balance study, Economics of groundwater use.
5. Open dug wells, design of open wells, Hydraulics of well, Well yield estimation.
6. Tube wells & Types, Tube well drilling & their equipments, types of drilling, usages

Sessional Work:

1. Visit to recharge system
2. Yield estimation

Readings:

1. Ground water hydrology by Todd D. K. John Wiley.
2. Ground water & Tube wells by Garg S. P. (Oxford & IBH.)
3. Ground water Assessment, Development & Management by Karanth K. R.
4. Ground water Assessment, Development & Management by PBS Sharma
5. Irrigation Theory & Practices by Michael A. M.

WLM- 242

MANAGERIAL PERSPECTIVES

1. Concepts, Nature, Process and significance of Management. Types of Management, Organization & their functioning: - Govt. Semi – Govt. Corporation, NGO, Private, Co – Operative, organization etc
2. Planning organizing coordination, supervision, motivation, leadership & control : Discussion of these concepts with stress on farm – management.
3. Role of Farmer – as a Manager and entrepreneur.
4. Present decision – making process of farmer and all possible applications of modern management techniques to improve this process [such as optimization techniques , data base analysis , etc]
5. Agriculture Marketing: Weekly Bazars, APMC, APEDA, Marketing Federations, Pvt. Companies, Legal aspects of marketing reforms.

Reading:

1. Principles of Management : by Dunker Pagare
2. Principles of Management : by Terry
3. Ozarche Pani [Marathi] by kaka upadhye
4. Productivity of Land & Water Ed. Jayant Patil , M.A. Chitale , & S. B. Varade , New Age International Publishers.
5. राजहंस पकाशन : योध्दा शेतकरी - ले. विजय परूळकर

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RESEARCH METHODOLOGY -III (DISSERTATION)

1. Introduction: Meaning of Research, Types of Research, Research & scientific methods with references to water & Land Management & Agricultural & Marketing.
2. Defining the research problems, Identification of Research problems, Technique involved in defining the problems
3. Research design: Meaning and need of research design, features of a good design, important concepts relating to research design.
4. Sampling designing, Census and sample survey, steps in sample design, Different types of sample designs.
5. Testing of hypothesis.

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DRINKING WATER MANAGEMENT

1. Purpose of water use: domestic, cultural, industrial, for animals, sanitation, forest needs. Per capita consumption.
2. Demand and supply, Management of drinking water, factors affecting demand
3. Population: Definition, Estimation, Methods of population estimation
4. Sedimentation, theory of sedimentation, types of sedimentation tanks, Numerical, Coagulation, Usual coagulants, Flocculation, factors
5. Filtration, theory of filtration, principles, factors, classification of filters, Numerical
6. Water & health: Water quality assessment, Methods of purification & maintenance.
7. Recycling & reusing of waste water – Municipal, Industrial
8. Roof -Top rainwater Harvesting: Introduction, Need, Types, Design

Reading:

1. Water Supply Engineering - by Birdie
- by Rangwala
2. Environmental Engineering & Management- by Dhameja
3. Irrigation & Water Power Engineering – by B.C. Punmia, Pande
4. Chapt.13: Water Harvesting of Soil & Water Conservation Engg. by R. Suresh

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ENVIRONMENTAL ASPECTS OF WATER RESOURCES DEVELOPMENT

1. Adverse effects of irrigated agriculture and industrial development related to water, Eutrophication of lakes.
2. Environmental impact assessment: Water logging, Salinity, Alkalinity;
3. Mitigating measures: Drainage & Other Remedies.
4. Impact of non – irrigation water use on irrigation, cost of water for non – irrigation purposes,
5. Laws related to Environmental protection, Health of soil, and Reuse of water

Readings:

1. Environmental Impact Assessment – by Canter
Pub: Academic Press- Network.
2. Environmental Engineering & Management- by Dhameja

