

**CIRCULAR NO.SU/Sci. & Tech./University Deptt./NEP/25/2023**

It is hereby inform to all concerned that, the syllabi prepared by the Departmental Committee and recommended by the Dean, Faculty of Science & Technology, the Hon'ble Vice-Chancellor has accepted **the following curriculum of All Post Graduate Degree Courses as per Norms of National Education Policy - 2020 under the Faculty of Science & Technology run at University Department, Dr.Babasaheb Ambedkar Marathwada University, Aurangabad** in his emergency powers under section 12(7) of the Maharashtra Public Universities Act, 2016 on behalf of the Academic Council as appended herewith.

Sr.No.	Syllabi of the Department under BAMU Aurangabad.	Semester
1.	M.Sc.Electronics	Ist to IVth Semester
2.	M.Sc.Rural Technology	Ist Semester
3.	M.Sc.Coservation of Biodiversity	Ist Semester

This is effective from the Academic Year 2023-24 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.

REF.NO.SU/NEP/2023/10560-69

Date:- 22.08.2023.

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*Deputy Registrar,
Academic Section*

Copy forwarded with compliments to :-

- 1] Head of the Department, Department of Electronics, Dr.Babasaheb Ambedkar Marathwada University, Aurangabad.
- 2] Head of the Department/Director, Department of Gopinathrao Munde National Institute of Rural Development & Research, Dr.Babasaheb Ambedkar Marathwada University, Aurangabad.
- 3] The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.

Copy to :-

- 1] The Director, Board of Examinations & Evaluation, Dr.BAMU,A'bad.
- 2] The Section Officer,[M.Sc.Unit] Examination Branch,Dr.BAMU,A'bad.
- 3] The Programmer [Computer Unit-1] Examinations, Dr.BAMU,A'bad.
- 4] The Programmer [Computer Unit-2] Examinations, Dr.BAMU,A'bad.
- 5] The In-charge,[E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr.BAMU,A'bad.
- 6] The Public Relation Officer, Dr.BAMU,A'bad.
- 7] The Record Keeper, Dr.BAMU,A'bad.

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

**GOPINATHRAO MUNDE NATIONAL INSTITUTE OF
RURAL DEVELOPMENT AND RESEARCH**



Reaccredited with 'A' Grade

FACULTY OF SCIENCE & TECHNOLOGY

2 Years P.G. Programme in Science

(M.Sc.)

As per National Education Policy - 2020

(To be implemented from Academic Year - 2023-24)

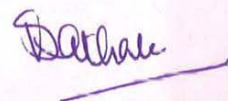
Course Structure and Curriculum

(Outcome based Credit System)

Subject: CONSERVATION OF BIODIVERSITY

(Effective from 2023-24)


Dean
Faculty of Science & Technology
Dr. Babasaheb Ambedkar Marathwada
University, Aurangabad



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1. Preamble

Rural development needs an integration of all areas of knowledge. It needs multi-disciplinary approach towards the rural development ideology. The GMNIRD is committed to empower the youth for rural development by catering the needs of the rural development. It will integrate all local institutions, industries and organizations in the vicinity for the universal coordination of knowledge for overall rural growth & development.

The GMNIRD is established in the Dr. Babasaheb Ambedkar Marathwada University campus as one of the constituent Institute for conducting academic, research, training and extension activities associated with the rural development and management. It is a multi-disciplinary Institute covering all disciplines of science, technology, social sciences, agricultural sciences, trade and managerial subjects.

2. Course Structure

Two-Year Post-graduate Program

Course and Credits Distribution of Two years Master's Degree Program with Entry & Exit option

Faculty of Science and Technology

Year / level	Se m.	Major subject		RM	OJT /FP	RP	Credits	Degree	
		DSC Core Mandatory	DSE (Elective)						
First year 6.0	I	3(4) +2=14	4	4			22	PG Diploma (After 3 years degree)	
	II	3(4) +2=14	4		4		22		
Cum. Cr. For PG Diploma		28	08	4	4		44		
Exit option with Post-graduate Diploma (44 credits) after first year or two semesters with completion of courses equivalent to 44 credits									
Second Year 6.5	III	3(4) +2=14	4			4	22	PG Degree after 3 years UG or PG Degree after 4 years UG	
	IV	3 (4) = 12	4			6	22		
Cum. Cr. For 1 year PG Degree		26	8			10	44		
Cum. Cr. For 2 years PG Degree		54	16	4	4	10	88		
2 Years -4 sem.PG Degree (88 credits) after three-year UG Degree or 1 Year -2 sem. PG Degree (44 credits) after four year UG degree									

ABBREVIATION:

Major – Comprising Mandatory –is based on specialization

DSE- Discipline Specific Elective

OJT – On-the- Job Training

FP – Field Project (Corresponding to the Major (Core) Subject

RP – Research Project (Corresponding to the Major (Core) Subject

Internship/Apprenticeship - (Corresponding to the Major (Core) Subject

AS PER NEP 2020

**Illustrative Credit distribution structure for Two Years Master's Degree Programme with
Multiple Entry and Exit options –**

Class: M. Sc. First Year Semester: Ist Subject: Conservation of Biodiversity

Course type	Course Code	Course Name	Teaching Scheme (Hrs./ week)		Credits Assigned		Total Credits
			Theory	Practical	Theory	Practical	
Major Mandatory DSC	MCB/MJ/500-T		3	-	3	-	14
	MCB/MJ/501-T		3	-	3	-	
	MCB/MJ/502-T		3	-	3	-	
	MCB/MJ/503-T		2		2		
	MCB/MJ/504-P		-	2	-	1	
	MCB/MJ/505-P		-	2	-	1	
	MCB/MJ/506-P		-	2	-	1	
DSE (Choose any one from pool of courses)	MCB/DSE/507-T		3		3		04
	MCB/DSE/508-P			2		1	
	or						
	MCB/DSE/509-T		3		3		
	MCB/DSE/510-P			2		1	
	or						
	MCB/DSE/511-T		3		3		
RM	MCB/DSE/512-P			2		1	04
	MCB/RM/513-T		4	-	4	-	
			18	08	18	04	22 credits

1. Major Mandatory (DSC)

MCB/MJ/500-T	Fundamentals of Biodiversity and Conservation
MCB/MJ/501-T	Biodiversity Conservation, Human Society and Ethics
MCB/MJ/502-T	Ecosystem, Genetics and Species Diversity and Conservation
MCB/MJ/503-T	Planning and Execution of Field surveys
MCB/MJ/504-P	Lab-I: Fundamentals of Biodiversity and Conservation
MCB/MJ/505-P	Lab-II: Biodiversity Conservation, Human Society and Ethics
MCB/MJ/506-P	Lab-III: Ecosystem, Genetics and Species Diversity and Conservation

2. Discipline Specific Electives: (Choose any one from Pool /Basket)

MCB/DSE/507-T	Greenhouse Technology
MCB/DSE/508-P	Lab-I: Greenhouse Technology
or	
MCB/DSE/509-T	Environmental Pollution and Control
MCB/DSE/510-P	Lab-II: Environmental Pollution and Control
or	
MCB/DSE/511-T	Development of Communication in conservation
MCB/DSE/512-P	Lab-III: Development of Communication in conservation

3. Research Methodology (RM): MCB/RM/513-T

Class: M. Sc. First Year Semester: IInd Subject: Conservation of Biodiversity

Course type	Course Code	Course Name	Teaching Scheme (Hrs./ week)		Credits Assigned		Total Credits
			Theory	Practical	Theory	Practical	
Major Mandatory DSC	MCB/MJ/550-T		3		3		14
	MCB/MJ/551-T		3		3		
	MCB/MJ/552-T		3		3		
	MCB/MJ/553-T		2		2		
	MCB/MJ/554-P			2		1	
	MCB/MJ/555-P			2		1	
	MCB/MJ/556-P			2		1	
DSE (Choose any one from pool of courses)	MCB/DSE/557-T		3		3		04
	MCB/DSE/558-P			2		1	
	or						
	MCB/DSE/559-T		3		3		
	MCB/DSE/560-P			2		1	
	or						
	MCB/DSE/561-T		3		3		
	MCB/DSE/562-P			2		1	
OJT/FP	MCB/OJT/FP/563-T		-	4	-	4	04
			14	12	14	08	22 credits

1. Major Mandatory (DSC)

MCB/MJ/550-T	Biotechnological and Phylogenetic Approaches to Biodiversity Conservation
MCB/MJ/551-T	Quantitative Biology
MCB/MJ/552-T	Taxonomy and Systematics of Plants, Animals and Microbes
MCB/MJ/553-T	Remote sensing and GIS applications for Environmental Monitoring
MCB/MJ/554-P	Lab-I: Biotechnological and Phylogenetic Approaches to Biodiversity Conservation
MCB/MJ/555-P	Lab-II: Quantitative Biology
MCB/MJ/556-P	Lab-III: Taxonomy and Systematics of Plants, Animals and Microbes

2. Discipline Specific Electives: (Choose any one from Pool /Basket)

MCB/DSE/557-T	Natural Resources and their conservation
MCB/DSE/558-P	Lab-I: Natural Resources and their conservation
or	
MCB/DSE/559-T	Soil Conservation and Management
MCB/DSE/560-P	Lab-II: Soil Conservation and Management
or	
MCB/DSE/561-T	Water Resource Management
MCB/DSE/562-P	Lab-III: Water Resource Management

3. OJT/FP-1: Field Project-I: MCB/OJT/FP/563-P

Class: M. Sc. Second Year Semester: IIIrd Subject: Conservation of Biodiversity

Course type	Course Code	Course Name	Teaching Scheme (Hrs./ week)		Credits Assigned		Total Credits
			Theory	Practical	Theory	Practical	
Major Mandatory DSC	MCB/MJ/600-T		3		3		14
	MCB/MJ/601-T		3		3		
	MCB/MJ/602-T		3		3		
	MCB/MJ/603-T		2		2		
	MCB/MJ/604-P			2		1	
	MCB/MJ/605-P			2		1	
	MCB/MJ/606-P			2		1	
DSE (Choose any one from pool of courses)	MCB/DSE/607-T		3		3		04
	MCB/DSE/608-P			2		1	
	or						
	MCB/DSE/609-T		3		3		
	MCB/DSE/610-P			2		1	
	or						
	MCB/DSE/611-T		3		3		
RP-1	MCB/RP-1/649-P			8		4	04
			14	16	14	08	22 credits

1. Major Mandatory (DSC)

MCB/MJ/600-T	Biodiversity Conservation and Climate Change
MCB/MJ/601-T	Conservation Policies and Laws
MCB/MJ/602-T	Animal Ecology and Behaviour
MCB/MJ/603-T	Environmental Monitoring and Audit
MCB/MJ/604-P	Lab-I: Biodiversity Conservation and Climate Change
MCB/MJ/605-P	Lab-II: Conservation Policies and Laws
MCB/MJ/606-P	Lab-III: Animal Ecology and Behaviour

2. Discipline Specific Electives: (Choose any one from Pool /Basket)

MCB/DSE/607-T	Environmental Chemistry
MCB/DSE/608-P	Lab-I: Environmental Chemistry
or	
MCB/DSE/609-T	Plant Reproductive Ecology
MCB/DSE/610-P	Lab-II: Plant Reproductive Ecology
or	
MCB/DSE/611-T	Environment & Disaster Management
MCB/DSE/612-P	Lab-III: Environment & Disaster Management

3. RP-1: Research Project-1: MCB/RP-1/649-P

Class: M. Sc. Second Year Semester: IVth Subject: Conservation of Biodiversity

Course type	Course Code	Course Name	Teaching Scheme (Hrs./ week)		Credits Assigned		Total Credits
			Theory	Practical	Theory	Practical	
Major Mandatory DSC	MCB/MJ/650-T		3		3		14
	MCB/MJ/651-T		3		3		
	MCB/MJ/652-T		3		3		
	MCB/MJ/653-P			2		1	
	MCB/MJ/654-P			2		1	
	MCB/MJ/655-P			2		1	
DSE (Choose any one from pool of courses)	MCB/DSE/656-T		3		3		04
	MCB/DSE/657-P			2		1	
	Or						
	MCB/DSE/658-T		3		3		
	MCB/DSE/659-P			2		1	
	Or						
	MCB/DSE/660-T		3		3		
RP-2	MCB/DSE/661-P			2		1	04
	MCB/RP-2/699-P			12		6	
			12	20	12	10	22 credits

1. Major Mandatory (DSC)

MCB/MJ/650-T	Human Aspects of biodiversity and Environment
MCB/MJ/651-T	Wild life biology and Environmental Stress Biology
MCB/MJ/652-T	Urban Biodiversity Strategies for Conservation
MCB/MJ/653-P	Lab-I: Human Aspects of biodiversity and Environment
MCB/MJ/654-P	Lab-II: Wild life biology and Environmental Stress Biology
MCB/MJ/655-P	Lab-III: Urban Biodiversity Strategies for Conservation

2. Discipline Specific Electives: (Choose any one from Pool /Basket)

MCB/DSE/656-T	Principle and Practices of Sustainable Development
MCB/DSE/657-P	Lab-I: Principle and Practices of Sustainable Development
Or	
MCB/DSE/658-T	Applications of Information Technology in Field Biology
MCB/DSE/659-P	Lab-II: Applications of Information Technology in Field Biology
Or	
MCB/DSE/660-T	Bio-resource Exploration
MCB/DSE/661-P	Lab-III: Bio-resource Exploration

3. RP-1: Research Project-2: MCB/RP-2/699-P

3. Vision

1. Improving the quality of life of the rural population.
2. To improve the infrastructure of the rural areas.
3. To reduce unemployment by providing opportunities for employment.
4. To provide clean water, electricity, employment and proper communication for rural development.
5. To ensure an improvement in the underprivileged populations standard of living.

4. Mission

1. To achieve enhanced crop production for rural areas.
2. To bring about a greater socio-economic equity.
3. To bring about a spatial balance in socio-economic development.
4. To bring about improvement in the ecological environment.
5. To develop broad-based community participation for the rural development.

5. Program Educational Objectives

1. The Programme has been framed to provide an understanding and experience of different aspects of Rural Development.
2. It is to provide a holistic perspective of schemes/programmes of central government in general and state government in particular.
3. It is innovative, skill and employment oriented to attract bright students to the discipline of rural development.

6. Program Outcomes (POs) and Program Specific Outcomes (PSOs)

PO1: Knowledgeable persons in concerned subjects.

PO2: Qualified and employable candidates in careers related to teaching and research that require Post-graduation.

PO3: Individuals with aptitude and skill in research.

PO4: Persons having innovative ideas and necessary training to initiate unique start-ups.

PO5: Young leaders who offer their service to the betterment of the community.

PSO 1: Mastery in biodiversity and its conservation strategies.

PSO 2: Experience and identify the diversity of plant and animal kingdom, from lower to higher level

PSO 3: Recognize the need to conserve the wealth of Biodiversity

PSO 4: Address environmental issues related to biodiversity

PSO 5: Create social awareness in biodiversity conservation and sustainable utilization of bioresources

7. Eligibility

- i) Candidates who have passed any Bachelor's degree [10+2+3+4] of Science, Engineering, Agriculture, and any other equivalent degree of statutory University recognized equivalent thereto must have obtained minimum aggregate **50** per cent marks for open categories and minimum **45** per cent marks for reserved categories.
- ii) He/ She should have passed the Entrance Test conducted by the University with the specified criteria.

8. Duration

- The course shall be a Post-Graduate Full Time Course.
- The duration of course shall be of Two years with Four Semesters.
- Maximum Period for Completion of Programme would be four years.

9. Medium of Instruction

The medium of instruction shall be in English.

10. Attendance

11. Evaluation Methods/Scheme of Examination

12. CURRICULUM FOR SEMESTER – I

GOPINATHRAO MUNDE NATIONAL INSTITUTE OF RURAL DEVELOPMENT & RESEARCH

(MANDATORY SUBJECT- 01)

Course Code No.: MCB/MJ/500-T		No. of Credits: 03	Hours: 45
Course Title	Fundamentals of Biodiversity and Conservation		
Course Objectives:			
1.To define different ecosystems and biological diversity 2.To extend the importance of interactions among the species 3.To demonstrate the importance of maintains, conservation of ecosystem 4.To illustrate the significance of conservation of agricultural biodiversity			
Unit	Course Content		Periods
I	Biodiversity Concept, definition and type of biodiversity, biodiversity at global, country and local level, evolution of biodiversity, factor promoting high diversity, Endemism and hotspots of biodiversity, India as mega biodiversity nation, wealth of Indian hot spots, monitoring and measures of biodiversity.		09
II	Values of Biodiversity 2.1. Utilitarian value and their categories, direct use value; indirect/ Non-consumptive use value. 2.2.Ecological Economics; Monetizing the value of Biodiversity; Intrinsic Value; Ethical and aesthetic values, Anthropocentrism, Biocentrism, Ecocentrism and Religions; Intellectual Value; 2.3.Biodiversity and sustainable development		09
III	Threats to Biodiversity 3.1. Habitat destruction, fragmentation, transformation, degradation and Loss: Causes, Patterns and consequences on the Biodiversity of Major Land and Aquatic Systems 3.2. Impact of human development on biodiversity Invasive species: their introduction pathways, biological impacts of invasive species on terrestrial and aquatic systems 3.3. Effect of pollution on biodiversity: Impacts of pesticide pollution, water pollution and air pollution on biodiversity Overexploitation: Impacts of exploitation on target and non-target terrestrial andaquatic species and ecosystems Extinction: Types of extinctions, processes responsible for species extinction,current and future extinction rates, extinction/biological crisis		09

IV	Conservation Planning and Climate Change The Bioclimatic Envelope Model for individual species; Climate Change - Integrated strategies for Conservation; Predictions on future responses of ongoing Climate Change on Biodiversity, Potential Adaptation Options and their consequences on Ecosystems and Biodiversity, REDD+, Synergies between Sustainable Use of Biodiversity and Climate Change	09
V	Conservation of Agricultural Biodiversity 5.1. Conserving species of Economic significance 5.2. Significance of gene banks and germ plasm conservation 5.3. Use of wild species for producing improved hybrid varieties 5.4. Seed Banks & Artificial seeds in conservation 5.5. Conservation of Live Stock species /varieties Alternate species for future food securities (examples); Job's tear plant (<i>Coix lacrymajobi</i>) Indian wild buffalo (<i>Bubalus arnee</i>) Mithun (<i>Bos frontalis</i>). Hybrids between wild and domestic species (e.g. Mithun) Conservation of economically important aquatic species	09

Course Outcomes

1. To understand different type of ecosystem services and provide examples of ultimate and proximate threats to biodiversity and ecosystem integrity.
2. To understand that ecological processes are essential for maintaining biodiversity and ecosystem integrity.
3. To understand the habitat loss and fragmentation and their impacts on biodiversity and ecosystem integrity
4. To understand threats posed by global climate change to biodiversity

Suggested Readings

1. Groom, M. J., Meffe, G. R. and C. R. Carroll. 2006. Principles of Conservation Biology. Sinauer Associates, Inc., USA.
2. Krishnamurthy, K. V. 2003. Textbook of Biodiversity, Science Publication.
3. Primack, R. 2006. Essentials of Conservation Biology. Sinauer Associates, Inc., USA.
4. Hamblin, C. 2004. Conservation. Cambridge University Press.
5. Van Dyke, F. 2008. Conservation Biology Foundations, Concepts, Applications 2nd Edition, Springer.

**GOPINATHRAO MUNDE NATIONAL INSTITUTE OF RURAL
DEVELOPMENT & RESEARCH
(MANDATORY SUBJECT- 02)**

Course Code No.: MCB/MJ/501-T		No. of Credits: 03	Hours: 45
Course Title:	Biodiversity Conservation, Human Society and Ethics		
Course Objectives			
1. To demonstrate the role of ethics, values, and norms in producing culturally attuned and effective conservation techniques			
2. To create awareness about biodiversity and its essential role in the overall health of human			
3. To explain the benefit to human health of maintaining biodiversity			
Unit	Course Content		Periods
I	Sustainability 1.1. Humans and sustainability - An overview, sustaining key resources: Food, soil and pest management, Sustaining water resources, Energy efficiency and renewable energy, Environmental problems, their causes and sustainability 1.2. Sustaining biodiversity- Sustaining biodiversity: The Species Approach, Sustaining Terrestrial biodiversity: The Ecosystem Approach, Sustaining Aquatic biodiversity: The Ecosystem Approach Sustaining Human societies-Nature and society, sociology of environmental knowledge, Sensitivity towards sustaining nature, Environmental/Conservation Ethics		09
II	Economics and Biodiversity Ecosystem services and biodiversity conservation, Economic valuation of environmental goods, Cost and benefits of land use conversion, Measuring benefits and loss, Economic values and moral issues Methodologies of Economic valuation- A classification of valuation procedures, The direct valuation approach, The indirect valuation approach, Conventional market approaches, Choice of valuation techniques		09
III	Biodiversity and Human Health Biodiversity Loss and implication for human health - Causes and consequences of biodiversity loss, Ecosystem disturbances and their effects on infectious diseases, Vector, pathogen and host diversity and human infectious disease, Climate change and its effect on infectious disease Medicines from nature - History of natural products as medicines, Role of traditional		09
IV	Biodiversity and Traditional Health Systems Indigenous people and conservation, Significance of traditional ways of life, Ethno- biology and Ethno-pharmacology, Benefits from Ethno-botanical discoveries for native communities, Opportunities for collaboration between biomedical and conservation communities,		09

	Biodiversity and human dimension- Cultural and biological diversity, Indigenous movement and conservationists, Conservation through self-determination, Green consumerism, Conservation education, integrated conservation and development	
V	Tracking Biodiversity Towards Management Biodiversity indicators: Surrogate species, taxon based biodiversity indicators, structure and function based biodiversity indicators, ecological redundancy and functional based indicators Medicines from nature - History of natural products as medicines, Role of traditional	09

Course Outcomes:

1. To provide ecosystem services, economic values and moral approach.
2. To examine bio-diversity laws and its implication for human health.
3. To identify bio-diversity indicators and ecological redundancy.

Suggested Reading

1. Miller, G. T. and Spoolman, S. 2011. Living in the environment. Cengage learning
2. Pearce, D. W. and Moran, D. 1994. The Economic value of Biodiversity. Earthscan Publishers
3. Kontoleon, A., Pascual, U and Swanson, T. 2007. Biodiversity Economics: Principles Methods and Applications. Cambridge University Press
4. Chivian, E and Bernstein, A. 2008. Sustaining life: How human health depends on biodiversity. Oxford university press
5. Macnaghten, P and Urry, J. 1998. Contested Natures. SAGE publications Ltd.
6. Mulder, M. B. and Coppolillo, P. 2004. Conservation: Linking Ecology, Economics and Culture. Princeton University Press
7. Tellegen, E and Wolsink, T. (Eds.) 1998. Society and its Environment. Routledge Press
8. Wood, P. M. 2000. Biodiversity and democracy: rethinking society and nature. University of British Columbia Press.
9. Grifo, F. and Rosenthal, J. 1997. Biodiversity and Human Health: Implications for human health. Island Press
10. Groom, M. J., Meffe, G. R. and Carroll, C. R. 2006. Principles of Conservation Biology, Sinauer Associates, Inc., USA.

**GOPINATHRAO MUNDE NATIONAL INSTITUTE OF RURAL
DEVELOPMENT & RESEARCH
(MANDATORY SUBJECT- 03)**

Course Code No.: MCB/MJ/502-T		No. of Credits: 03	Hours: 45
Course Title:	Ecosystem, Genetics and Species Diversity and Conservation		
Course Objectives			
1. To define ecological efficiencies, ecosystem resilience and tropic dynamics			
2. To classify genetic diversity, gene flow, and gene erosion			
3. To examine ecosystem, genetics, species diversity and their conservation methods			
4. To interpret intra and inter specific computation			
Unit	Course Content		Periods
I	Ecosystem Concept Introduction and overview of ecosystem ecology- Ecosystem structure and functioning, Ecosystem diversity and landscapes, Ecosystem resilience and change, Trophic dynamics and temporal dynamics, Ecological efficiencies, Human induced Ecosystem change, Urban Ecosystem. Species effects on ecosystem processes- Overview, Functional type effects, Functional type response, integrating the effects of traits on ecosystems, Species interaction and ecosystem processes, Ecosystem Services		09
II	Applied Population Biology Gathering Ecological Information, Monitoring Population of species, establishing new populations, Behavior of released animals, Evaluation of successful programs through case studies. Ex-situ conservation strategies: An overview, Botanical Gardens and Arboreta, Zoological Parks, Aquaria, Seed Banks.		09
III	Genetic Biodiversity and Conservation Definition and importance of genetic variation, within individuals, within and between populations 3.1. Understanding population genetics Measuring genetic diversity: The Hardy-Weinberg law; genetically effective populations size, Gene flow-Genetic pollution and gene erosion 3.2. Evolutionary forces for genetic variation Genetic drift: Wahlund effect, Inbreeding depression, Out breeding depression, Mutation, Natural selection: Genetic load and Mutation-selection balance 3.3. Conservation Genetics and Management Time scale of concern in species revival; Use of genetic information in identification and prioritization of groups for conservation, for designing and implementation of reproductive strategies in plants and animals, and in population estimation; Understanding different levels of population exploitation on of genetic diversity.		09
IV	Species Diversity and Conservation 4.1. Density independent growth: Fundamentals of population growth, Types of models, Density independent versus density dependent growth,		09

	Geometric growth in populations with non-overlapping generations, Exponential growth in populations with overlapping generations, The finite rate of increase and the intrinsic rate of increase 4.2. Density dependent growth and intraspecific competition: Density dependence in populations with discrete generations, Density dependence in populations with overlapping generations, Non-linear density dependence of birth and death rates and the Allee effect, Behavioral aspects of intraspecific competition 4.3. Population regulation: Understanding population regulation, combining density dependent and density independent factors, Tests of density dependence	
V	Community Ecology 5.1. Interspecific and intraspecific Competition, Host-Parasite interactions, Predator- prey interactions, Plant herbivore interaction 5.2. Community ecology- Structure and function of communities, Functional aspects of communities, Stability and change in communities, Regulation of communities- Role of species diversity, Role of predators, Role of competition, Role of nutrients, other factors	09

Course Outcomes

By completing this course, the student will be able to:

1. The scope of biodiversity, including ecosystem, species, and genetics diversity
2. Assessment of species diversity, rapid assessment techniques, strength and weakness of concepts such as keystone, indicator species and species diversity indices.
3. To interpret the role of climate change, competition, nutrients, and species diversity.

Suggested Readings

1. Hastings, A. (Ed.). 1953 Population biology: concepts and models. Springer Science and Business Media
2. Neal, D. 2004. Introduction to Population Biology. Cambridge University Press.
3. Vandermeer, J. H. and Goldberg, D. E. 2013. Population Ecology: First principles. Princeton University Press.
4. Begon, M., Mortimer, M. and Thompson, D. J. 2009. Population ecology: A unified study of animals and plants. John Wiley & Sons.
5. Lomnicki, A. 1988. Population Ecology of Individuals. Princeton University Press.
6. Rockwood, L. R. 2015. Introduction to Population Ecology. John Wiley & Sons.
7. Smith, R. L. and Smith, T. M. 2014. Elements of Ecology. Benjamin-Cummings Publishing Company.
8. Primack, R. 2014. Essentials of Conservation Biology (Sixth Edition) Sinauer Associates, Inc., USA
9. Morris, W. F. and Doak, D. F. 2002. Quantitative Conservation Biology: Theory and practice of Population Viability Analysis. W. H. Freeman Publishers.
10. Landi, R., Engen, S. and Saether, B. 2003. Stochastic population dynamics in Ecology and conservation. Oxford University Press.
11. Groom, M. J., Meffe, G. R. and Carroll, C. R. 2006. Principles of Conservation Biology, Sinauer Associates, Inc., USA.
12. Gardner, E. J. 1975. **Principles of Genetics**. John Wiley and Sons.
13. Hamilton, M. 2009. **Population Genetics**. Wiley-Blackwell Publications, USA
14. Hedrick, P. W. 1999. **Genetics of Population**. Jones and Bartlet Publishers, Inc., London.
15. Lockwood, M., Vorboys, G. and Kothari A. (Ed.). Managing Protected Areas

**GOPINATHRAO MUNDE NATIONAL INSTITUTE OF RURAL
DEVELOPMENT & RESEARCH
(MANDATORY SUBJECT- 04)**

Course Code No.: MCB/MJ/503-T		No. of Credits: 02	Hours: 30
Course Title:	Planning and execution of Field Surveys		
Course Objectives			
1. To study the field work Techniques, Sampling and Data Collection methods			
Unit	Course Content		Periods
I	Field surveys & observations Sampling methods and identifying study sites Different methods of transacts& quadrates Techniques of field observation Camouflages& Observation stations Non-intruding / non-interfering techniques of field observations		06
II	Recording & Evaluation of Data Field note book and its records Qualitative & Quantitative data Field kit and its usage Cameras, binoculars, field scopes, camera traps etc. Different methods of recording field observations Use of rings / tags, Color codes, Colour marking on animals		06
III	Ethics in Field Studies Dos & Don'ts in field studies Regulatory permissions for field observations Field collections & Field preservations		06
IV	Statistical Methods (use examples from wildlife, forestry and field experimentation) Identifying sampling sites &Determining sample size Central tendencies & their applications		06
V	Working with qualitative data Depiction of data (tables, charts, graphs, Pictograms, kite diagrams etc.) Methods to evaluate significance of results Concept of confidence interval & its application		06

Course Outcomes

By completing this course, the student will be able to:

1. Acquire competence in handling surveying instruments in individual capacity
2. Have an in-depth knowledge on Plate table survey; counteracting with Dumpy Level; measuring of height and traversing by Theodolite
3. Acquire knowledge and clear concepts of the different survey instruments

Suggested Readings

1. Cochran, W.G. (1977). Sampling Techniques. Third Edition. John Wiley and Sons.
2. Des Raj (1968). Sampling Theory. TATA McGRAW-HILL Publishing Co. Ltd.
3. Des Raj and Chandok, P. (1998). Sample Survey Theory. Narosa Publishing House.
4. Murthy, M.N. (1977). Sampling Theory and Methods. Statistical Publishing Society, Calcutta.

**GOPINATHRAO MUNDE NATIONAL INSTITUTE OF RURAL
DEVELOPMENT & RESEARCH
(MANDATORY SUBJECT- 01)**

Course Code No.: MCB/MJ/504-P		No. of Credits: 01	Hours: 30
Course Title	Fundamentals of Biodiversity and Conservation		
Course Objectives:			
1. To demonstrate the importance of maintains, conservation of ecosystem			
2. To illustrate the significance of conservation of agricultural biodiversity			
Unit	Course Content		Periods
1.	To Conduct a biodiversity survey in a local ecosystem, identify and document various species of plants, animals, and microorganisms.		02
2.	Research and present on a specific biodiversity hotspot, discussing its unique species, threats, and conservation efforts.		02
3.	Investigate endemic species in university campus area.		02
4.	Conduct a case study on a specific ecosystem service provided by biodiversity, such as pollination, water purification, or carbon sequestration.		02
5.	Plan and execute a habitat restoration project in a degraded area/land/dump site.		02
6.	Study the effects of pollution on local biodiversity by analyzing soil, water, and air quality in different environments.		02
7.	Determination of primary production as GPP & NPP by light and dark bottle technique and its importance for biodiversity conservation.		02
8.	Identification and inventory of phytoplankton diversity in water body.		02
9.	Identification and listing of zooplanktons diversity in water body.		02
10.	Ecological adaption of hydrophytes, mesophytes and xerophytes.		02
11.	Quantitative analysis of planktons by Sedgwick rafter cell method.		02
12.	Estimation of biomass and Productivity from grassland by harvest method.		02
13.	Determination of relative density, relative frequency and relative abundance of species by using simulation.		02
14.	Profile study of natural pond/lake and manmade reservoir.		02
15.	To study freshwater resources water quality parameters like pH, EC, total acidity, total alkalinity, DO, CO ₂ , TS, TDS, TSS, BOD, Coliform, MPN, etc.		02
16.	To study the cover and basal area of tree species.		02
17.	To study the light intensity by sunshine record.		02

**GOPINATHRAO MUNDE NATIONAL INSTITUTE OF RURAL
DEVELOPMENT & RESEARCH
(MANDATORY SUBJECT- 02)**

Course Code No.: MCB/MJ/505-P		No. of Credits: 01	Hours: 30
Course Title:	Biodiversity Conservation, Human Society and Ethics		
Course Objectives			
1. To create awareness about biodiversity and its essential role in the overall health of human			
2. To explain the benefit to human health of maintaining biodiversity			
Unit	Course Content	Periods	
1.	Identification of wild animals by using pug marks.	02	
2.	Identification of wild species by using feeding signs and artifacts.	02	
3.	Determination of relative abundance of light attracting insects by using light trap.	02	
4.	Determination of relative abundance of creeping invertebrates by using pitfall trap.	02	
5.	Determination of bird's population by using Lincoln index (Simulation).	02	
6.	Determination of total population of birds/ bats in their roost by using extrapolation method.	02	
7.	Determination of total population /density of birds from nesting ground during breeding season / or determination of total population of birds by using nests.	02	
8.	Identification of mammals from the hair morphology and histology.	02	
9.	To study the bird species by using vocal display.	02	
10.	Identification of wild species by direct observation in their habitat.	02	
11.	Determination of burrowing animal's population by using their artifacts.	02	
12.	Field visit for the study of wild species and collection of samples from various domestic and wild animals.	02	
13.	Visit to Zoo/ National Park /Sanctuary / Aquarium etc., for the study of wildlife.	02	
14.	Field visit to study the habitat components of wild species.	02	
15.	To study the natality of wild species during breeding season at zoo/aquarium / in closed ecosystem.	02	
16.	Enlisting the Environmental Laws for protection and conservation of Biodiversity.	02	
17.	Personal protection and conduct in Biodiversity practical in laboratory/field work.	02	

**GOPINATHRAO MUNDE NATIONAL INSTITUTE OF RURAL
DEVELOPMENT & RESEARCH
(MANDATORY SUBJECT- 03)**

Course Code No.: MCB/MJ/506-P		No. of Credits: 01	Hours: 30
Course Title:	Ecosystem, Genetics and Species Diversity and Conservation		
Course Objectives			
1. To examine ecosystem, genetics, species diversity and their conservation methods			
2. To interpret intra and inter specific computation			
Unit	Course Content		Periods
1.	Determine the required size of quadrat to study the vegetation by species area curve method.	02	
2.	Analyze the vegetation by Line transect method (Quadrat Method)	02	
3.	Analyze the vegetation by Belt transect method (Quadrat Method)	02	
4.	Biodiversity assessment of forest tree community.	02	
5.	Quantitative inventory of Liana abundance and diversity in relation to host trees.	02	
6.	Forest Biomass calculation by allometric method.	02	
7.	Determination of carbon stock of woody plant species.	02	
8.	Reproductive trait analysis for understanding forest component interactions.	02	
9.	Nutrient cycling in forest: Soil sampling and organic carbon.	02	
10.	Field Survey in Dr. B.A.M.U Campus for studying plant species diversity.	02	
11.	Ex-situ conservation of plant species using vitro technique.	02	
12.	Micropropagation of an endangered plant species.	02	
13.	Green pod (embryo culture) culture of orchid.	02	
14.	Blood Cell counting using Hemocytometer (RBC and WBC).	02	
15.	Microscopy: Handling of Dissection, Stereo and Compound microscopes.	02	
16.	Genetic study of model organisms and their significance. a. Bacteriophage- Lambada Phage b. Bacteria: E- coli c. Saccharomyces d. Rattus albicans e. Drosophila melanogaster	02	
17.	1. Staining Techniques: a. RNA and DNA- Methyl green and Pyronin b. Mitochondria- Janus green c. Lactobacillus and E-coli Gram Staining	02	
18.	Observation of Mitotic stages in permanent slides.	02	

**GOPINATHRAO MUNDE NATIONAL INSTITUTE OF RURAL
DEVELOPMENT & RESEARCH
(ELECTIVE SUBJECT- 01)**

Course Code No.: MCB/MJ/507-T		No. of Credits: 03	Hours: 45
Course Title:	Greenhouse Technology		
Course Objectives			
1. To develop the broad, general understanding of the agricultural industry and the role it plays in today's world as well as look more specifically at the role of ornamental horticulture and the greenhouse industry			
2. To develop the additional skills.			
3. To make students aware of Greenhouse construction and management skill			
Unit	Course Content		Periods
I	Green house technology- Introduction, Components and design of green houses, Advantages, Applications in agriculture Fundamentals of Green House Technology		12
II	Structure and Construction of a Green House. Designing and layout of green house, laying the greenhouse		12
III	Installation of greenhouse structure, erection of greenhouse structure Covering the greenhouse with nets and sheets		12
IV	Checking the first time leakages through the gutter Maintenance of greenhouse		12
V	Greenhouse Technology- Instruction in greenhouse structures and greenhouse environment regulations. Plant growth, development and propagation, production and maintenance of bedding and container produced plants.		12

Course Outcome

1. The students will get acquainted with greenhouse technology
2. Students will acquire the management skills for greenhouse.

Suggested Readings :

1. Greenhouse Technology for Controlled Environment 2009 by G.N. Tiwari
2. Greenhouse Technology - Management, Operations and Maintenance 2016 by N. N. Patil
3. Greenhouse Technology and Management 14 December 2012 by Nicolas Castilla and Esteban Baeza
4. Greenhouse Technology And Management 2016 by Hernandez Jose Del Sagrado

**GOPINATHRAO MUNDE NATIONAL INSTITUTE OF RURAL
DEVELOPMENT & RESEARCH
(ELECTIVE SUBJECT- 01)**

Course Code No.: MCB/MJ/508-P		No. of Credits: 01	Hours: 30
Course Title:	Greenhouse Technology		
Course Objectives			
To make students aware of Greenhouse construction and management skills.			
Unit	Course Content		Periods
1.	Preparation of soil and water samples for analysis in the lab, sanitation, and safety.		02
2.	Calibration of equipment's and preparation of different types of solutions.		02
3.	Preparation of soil samples for analysis.		02
4.	Methods of soil sampling from farmers field and processing soil samples for analysis.		02
5.	Estimation of N, P, K and OC of soil samples.		02
6.	Estimation of EC and TDS of water samples.		02
7.	To learn the structure and function of spectrophotometer.		02
8.	To conduct analysis of different parameters of water used for green house.		02
9.	Nursery establishment: types of nursery beds, Site selection, lay out, planning and records.		02
10.	Plotting and repotting of nursery plants.		02
11.	Identification of weeds and herbarium preparation.		02
12.	To learn the different methods of treatment and germination of seeds.		02
13.	To learn the breakdown method of seed dormancy.		02
14.	Functioning of different types of tools used in vegetative propagation.		02
15.	Identification of nutrient deficiency of Macronutrients i.e., N, P, and K and its rectification.		02
16.	Identification of nutrient deficiency of Micronutrients i.e., Zn, Cu, Fe, S, Mo, and B and its rectification.		02
17.	Maintenance of health and safety practices list at the workplace installation of Greenhouse.		02

**GOPINATHRAO MUNDE NATIONAL INSTITUTE OF RURAL
DEVELOPMENT & RESEARCH
(ELECTIVE SUBJECT- 02)**

Course Code: No: MCB/DSE/509-T		No. of Credits: 03	Hours: 45
Course Title:		Environmental Pollution and Control	
Course Objectives To study the different types of pollution and their effects on biodiversity			
Unit	Course Content		Periods
I	Introduction to Environmental pollution: Definition and sources of pollution; Different types of pollution and their global, regional and local aspects. Types and sources of air pollutants; Reaction of pollutants in air forming smog, PAN, Acid rain; Atmospheric diffusion and stack performance; Transport of pollutants; Effects of air pollutants on flora and fauna; Sinks of atmospheric gases.		09
II	Soil pollution and solid waste pollution: Causes of soil pollution; Effects of Fungicides and weedicides on soil components, residual toxicity and pollution. Different kinds of synthetic fertilizer (N, P, K), and their interactions with different components of soil, their toxicity and pollution. Industrial effluents and their interactions with soil components, Contamination by radio nuclides. Solid waste pollution: sources, nature, classification and environmental effects.		09
III	Radiation and Noise pollution: Radioactive decay; Interaction of radiation with matter; Biological impact and health hazards associated with radiation, Units of radioactivity and radiation dose; Protection against ionizing isotopes and their applications in waste water and air pollution analysis and treatment; Radioactive waste disposal. Basic properties of sound waves – plane and spherical waves, sound pressure, loudness and intensity levels, decibel; Sources of Noise Pollution–Measurement and analysis of sound, Measures to control noise pollution.		09
IV	Thermal pollution, Oil Pollution and Electronic waste (E-waste): Definition and sources, Chemical and biological effects of thermal pollution, Effect on marine life, bacteria and water quality and other aquatic biota; Thermal pollution from power plants and their control. Oil pollution and marine ecology, sources of oil pollution, factors effecting fate of oil after spillage movement, spreading, evaporation, emulsification, dispersion, remote sensing in water quality monitoring. Sources and types and constituents of E-wastes and its environmental consequences.		09
V	Water Pollution: Sources of water and their contamination; Types of pollutants, various industrial effluents such as pulp and paper mills, oil exploration and refinery, petrochemicals, iron and steel industries, domestic wastes, organic debris, agricultural wastes, pesticides; Eutrophication - causes and effects and control measures.		09

Course Outcomes

At the end of this course students should be able to

1. To understand different types of ecosystem services and provide examples of ultimate and proximate threats to biodiversity and ecosystem integrity.
2. To understand that ecological processes are essential for maintaining biodiversity and ecosystem integrity.
3. To understand the habitat loss and fragmentation and their impacts on biodiversity and ecosystem integrity.
4. To understand threats posed by global climate change to biodiversity.

Suggested Readings:

- 1) J.N.B. Bell (2002) Air Pollution and Plant Life, 2nd Edition, John Wiley and Sons, New Delhi.
- 2) Christon J. Hurst, Ronald L. Crawford, Guy R. Knudsen, Michael J. McInerney, Manual of Environmental Microbiology, 2nd edition, ASM Press. 2001.
- 3) Bruce Rittman, Perry L. McCarty. Environmental Biotechnology: Principles and Applications, 2nd Edition, McGraw-Hill, 2000.
- 4) Air Pollution – Stern
- 5) Environmental Pollution Control Engineering: C. S. Rao
- 6) Environmental Chemistry : B.K. Sharma, and H. Kaur
- 7) Air pollution – threat and response: D. A. Lynn
- 8) Air pollution and Environmental Protection – Legislative policies, Judicial trend and Social perceptions: N. Kumar; Mittal Publication

**GOPINATHRAO MUNDE NATIONAL INSTITUTE OF RURAL
DEVELOPMENT & RESEARCH
(ELECTIVE SUBJECT- 02)**

Course Code No.: MCB/MJ/510-P		No. of Credits: 01	Hours: 30
Course Title:	Environmental Pollution and Control		
Course Objectives To make students aware of Greenhouse construction and management skills.			
Unit	Course Content	Periods	
1.	Determination of Biological Oxygen Demand in wastewater	02	
2.	Solve the given problems on BOD.	02	
3.	Determination of Chemical Oxygen Demand in wastewater	02	
4.	Determination of oil and grease in wastewater.	02	
5.	Determination of H ₂ S in wastewater.	02	
6.	Characterization of solid waste.	02	
7.	Analysis of chemicals used in waste and wastewater treatment: i. Analysis of alum non-ferric alum a. Determination of water insoluble matter in non-ferric alum. b. Determination of water-soluble aluminum compounds as Alumina (Al ₂ O ₃) from alum by	02	
8.	Analysis of activated carbon a. Determination of moisture content in activated carbon. b. Determination of adsorbing power of activated carbon.	02	
9.	Analysis of bleaching powder. a. Determination of available chlorine in bleaching powder. b. Determination of stability of bleaching powder.	02	
10.	Analysis of caustic soda a. Determination of sodium hydroxide content from caustic soda. b. Determination of silicates from caustic soda. c. Determination of sulphates from caustic soda. d. Determination of chlorides from caustic soda.	02	
11.	Analysis of filter sand: a. Determination of effective size and coefficient of uniformity of filter sand b. Determination of bulk density of filter sand.	02	
12.	Lime analysis: a. Determination of moisture content in lime powder. b. Determination of percentage of oxides and hydroxides in lime. c. Determination of percentage of calcium in lime.	02	
13.	Problems on calculation of capacity of aeration tank in activated sludge process.	02	
14.	To study the design, working and problems of primary clarifier, trickling filter, and septic tank.	02	
15.	Determine of MLSS, MLVSS, & SVI of industrial wastewater.	02	

**GOPINATHRAO MUNDE NATIONAL INSTITUTE OF RURAL
DEVELOPMENT & RESEARCH**

(ELECTIVE SUBJECT- 03)

Course Code No.: MCB/DSE/511-T		No. of Credits: 03	Hours: 45
Course Title:		Development of Communication in Conservation	
1. Introduction to concept, model, theories, and approaches of communication for conservation of natural resources 2. To develop the communication skills of speaking, listening, reading, and writing 3. To write editorial or blog promoting a conservation issues.			
Unit	Course Content		Periods
I	1.1. Introduction to social and scientific writing Historical perspective, Ethics in scientific publishing, need for development communication 1.2. Orientation to writing for publications: Orientation to writing articles for general public; communication through Conference short term papers, theses, and dissertations; Writing short non-research papers, review articles, original Research papers, Avoiding Plagiarism; Preparation of a poster; Compilation of conference report; Organizing a workshop, seminar, conference. 1.3 Preparation of talks: Oral paper presentation with/without audio – visual support; Power Point Presentations, Scientific talks, Community talks		09
II	Communication Skills: a. Speaking: The essential qualifications of an effective speaker, conversation,extemporaneous speaking, and group discussion. b. Listening: Requirements for effective listening. Types of listening: listening to conversation, listening to class room lectures, listening to public lectures, listening to group discussions, listening and mass media. c. Reading: Dynamics of effective reading, reading for pleasure and appreciation, reading newspapers, reading magazines, reading books. d. Writing: Functional forms stories, editorials, book reviews, informal and formal essay, short stories, personal letters, scientific reports, biographical sketches, setting a theme, simple development of an idea, critical appraisal of facts and investigation reports.		09
III	Orientation to prepare a research Proposal Approach of writing a proposal, developing initial idea, Orientation to proposal writing, Understanding the nature and philosophy of the agency and funding environment, Need based program development, Writing the needs or problem statements, Writing the goals, objectives and implementation, Writing the evaluation plan, Budgeting and utilization, Agency capability and finishing touches.		09

IV	Communication: Definition & Functions, Elements and steps, Barriers of Communication, Types of Communication: Verbal and Nonverbal, Intrapersonal, Interpersonal, Group and Mass Communication, Characteristics and differences between various types, Definition, Elements and Functions of Mass Communication Channels of Mass Communication: Print, Radio, Television, Film, Video, New Media	09
V	Development: Definition, Meaning, Paradigms, Indicators, Changing concepts, Development communication: Definition and Concept, Various Approaches to Development Communication: Participatory Communication approach; Development Support Communication – Extension, Biodiversity, Conservation and development, Communication for Biodiversity and Conservation	09

Suggested Readings

1. Robert A. Day & Barbara Gastel, 2006. How to write and publish a scientific paper; 6th Edition; Cambridge University Press.
2. Soraya M. Coley & Cynthia A. Scheinberg 2001. Proposal Writing; Sage Publication.
3. Jacobson S. K. 2009. Communication Skills for Conservation Professionals, Island Press; Second Edition, USA M.Sc. Biodiversity & Conservation w.e.f. August 2015
4. Jacobson S. K., McDuff M. D. & Monroe M. C. 2006. Conservation Education and Outreach Techniques (Techniques in Ecology & Conservation). Oxford University Press, UK
5. Corbett J. B. 2006. Communicating Nature: How We Create and Understand Environmental Messages. Island Press; 2nd Edition.

**GOPINATHRAO MUNDE NATIONAL INSTITUTE OF RURAL
DEVELOPMENT & RESEARCH
(ELECTIVE SUBJECT- 03)**

Course Code No.: MCB/DSE/512-P		No. of Credits: 01	Hours: 30
Course Title:		Development of Communication in Conservation	
1. Introduction to concept, model, theories, and approaches of communication for conservation of natural resources			
2. To develop the communication skills of speaking, listening, reading, and writing			
3. To write editorial or blog promoting a conservation issues.			
Unit	Course Content		Periods
1.	Prepare a scrapbook of development related advertisement and news from the Newspaper.		02
2.	Design an advertisement on social issue for print media, radio and T.V.		02
3.	Collect and exhibit news on development issues on bulletin board.		02
4.	Visit any media house, compile the information, and submit reports.		02
5.	Write news and a feature for print media relating to home science issues.		02
6.	Script writing for a. Print b. Radio c. Television d. E- newsletters		02
7.	MS-Word a. Preparing a newsletter b. Designing your Biodata c. Creating and editing the table d. Create Mail Merge e. Advertisement Designing		02
8.	MS-Excel a. Operating on the sheets b. Using formulae and functions c. Perform student's mark statement. d. Display score boards using Pie charts. e. Display sales analysis using Bar charts.		02
9.	PowerPoint a. Creating a new presentation based on template. b. Display university details c. Displaying advertisement presentation.		02
10.	Panel discussion or debate based on a. Freedom of press b. Profit motive vs responsibility of media houses c. Censorship		02

11.	Analysis on freedom of press and its violation.	02
12.	To use the antiplagiarism software for the preparation of a research paper.	02
13.	To make poster presentation focusing on the status of the water pollution in Aurangabad city.	02
14.	To learn the applicability of biogeographical sketches of a provided area.	02
15.	To develop an initial idea for writing a research proposal.	02
16.	Create a short film on a relevant topic of Biodiversity conservation fulfilling all production aspects.	02
17.	Prepare a press release of an event of your department.	02
18.	Prepare a newsletter of your department to build its image.	02
19.	Study prominent PR campaigns and sketch how effectively PR is done, or Create a PR campaign based on nature conservation and health etc.	02

**GOPINATHRAO MUNDE NATIONAL INSTITUTE OF RURAL
DEVELOPMENT & RESEARCH**

(RESEARCH METHODOLOGY)

Course Code No.: MCB/DSE/513-T		No. of Credits: 04	Hours: 60
Course Title:		RESEARCH METHODOLOGY	
Course Objectives 1. Student will know the different research approaches, scientific methods, criteria for good research and innovation. 2. Student will get knowledge of problems encountered while working on research plan, Field and laboratory research problems. 3. Students will get the knowledge of data collection, tabulation, analysis and presentation of data. 4. Students can know how to collect the research data through experimentation, questioner, by direct observations and sensitivity study of spatial and temporal data. 5. Students will know importance of statistical analysis, errors occurring in the collected research data and proper interpretation of research analysis. 6. Students can design the research project with the help of review of produced results, techniques of interpretation, published literature and proper layout of research report			
Unit	Course Content		Periods
I	Definition of research, Objectives of research, Research approaches, Significance of research, Research and scientific methods, Innovation and research, Research process, Criteria of good research, Defining the research problem, Technique involved in defining a problem, Research designs, Developing a perspective research plan.		12
II	Data collection-by survey method and by experimentation. Types of data, Data presentation methods, Data analysis, process of data analysis, Sampling : Populations and samples, Probability and non probability samples. Simple Random and Stratified sampling.		12
III	Data collection by questioner method, by field visit and by direct observations, Measurements and experimentation, Measures for maintaining accuracy in data.		12
IV	Statistical analysis of data, Determination of mean, Median, mode, Dispersion, standard deviation, Stander errors of data, Correlation study, Significance of studies and Regression analysis of data.		12
V	Interpretation of data, Interpretation of produced results, Techniques of interpretation, Conclusion of research work, Reviewing of produced results/ output/data with the help of published literature, Scientific output as scientific principle or literature, Report writing, Steps in writing report, Layout of research report , Types of reports, review article writing.		12

Course Outcomes

Students should be able to:

1. Explain the different research approaches, scientific methods, criteria for good researches.
2. Describe the problems encountered while working on research plan, field and laboratory problems.
3. Collect research data through experimentation, questionnaire by direct observations and sensitivity study of spatial and temporal data.
4. Infer the importance of statistical analysis, errors occurring in the collected research data and proper interpretation of produced research
5. Design the research project with the help of review of produced research, techniques of interpretation, published literature and proper layout of research.
6. Acquire knowledge of data collection, presentation of data, data analysis and interpretations.

Suggested Readings

1. Research Methodology-Methods and Techniques, By Kothari C.R.(2011); New Age International Publisher, New Delhi.
2. Research methodology-Text and cases with SPSS applications” by Gupta S.L. and Hitesh Gupta (2011); International book house Pvt. Ltd, new Delhi.
3. “Statistical Methods” by S. P. Gupta, Publisher S. Chand and Sons.
4. “Fundamentals of Research methodology and statistics ” by Yogesh Kumar Singh , New Age International Publication, New Delhi.
5. “How SAGE has shaped Research methods A 40 years history” by John W Creswell, University of Nebraska. Lincoln.
“The Essence of Research Methodology, A Concise Guide for Master & Ph.D. students in management science, by Jan Jonker & Bartjan Pennink, Springer.

13. Curriculum for Semester – II

14. Curriculum for Semester -III

15. Curriculum for Semester - IV