

University of Mumbai



No. UG/45 of 2021-22

CIRCULAR:-

Attention of the Principals of the Affiliated Colleges, the Head of the University Departments and Directors of the Recognized Institutions in Faculty of Science & Technology is invited to the syllabus uploaded Academic Authority Unit which was accepted by the Academic Council at its meeting held on 4th March, 2014 vide item No.4.67 relating to the revised syllabus as per the (CBSGS) for the Two Years M.Sc. course in Biodiversity, Wildlife Conservation and Management (PSBWCM).

They are hereby informed that the recommendations made by the Board of Studies in Zoology at its meeting held on 26th June, 2020 vide item no.1 and subsequently passed by the Board of Deans at its meeting held on 27th January, 2021 vide item no.6.1® have been accepted by the Academic Council at its meeting held on 23rd February, 2021 vide item No.6.1 (R) and that in accordance therewith, the revised syllabus as per the (CBCS) of M.Sc. (Part-II) Biodiversity, Wildlife Conservation and Management (BWCM) (Part II) (Sem. III & IV) has been brought into force with effect from the academic year 2020-21, accordingly. (The same is available on the University's website www.mu.ac.in).

MUMBAI – 400 032

September, 2021

To

(Dr. B.N.Gaikwad)
I/c REGISTRAR

The Principals of the Affiliated Colleges, the Head of the University Departments and Directors of the Recognized Institutions in Faculty of Science & Technology. (Circular No. UG/334 of 2017-18 dated 9th January, 2018.)

A.C/6.1/23/02/2021

No. UG/45 -A of 2021

MUMBAI-400 032

15th September, 2021

Copy forwarded with Compliments for information to:-

- 1) The Dean, Faculty of Science & Technology,
- 2) The Chairman, Board of Studies in Zoology,
- 3) The Director, Board of Examinations and Evaluation,
- 4) The Director, Board of Students Development,
- 5) The Co-ordinator, University Computerization Centre,

(Dr. B.N.Gaikwad)
I/c REGISTRAR

Copy to :-

- 1. The Deputy Registrar, Academic Authorities Meetings and Services (AAMS),**
- 2. The Deputy Registrar, College Affiliations & Development Department (CAD),**
- 3. The Deputy Registrar, (Admissions, Enrolment, Eligibility and Migration Department (AEM),**
- 4. The Deputy Registrar, Research Administration & Promotion Cell (RAPC),**
- 5. The Deputy Registrar, Executive Authorities Section (EA),**
- 6. The Deputy Registrar, PRO, Fort, (Publication Section),**
- 7. The Deputy Registrar, (Special Cell),**
- 8. The Deputy Registrar, Fort/ Vidyanagari Administration Department (FAD) (VAD), Record Section,**
- 9. The Director, Institute of Distance and Open Learning (IDOL Admin), Vidyanagari,**

They are requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to in the above circular and that on separate Action Taken Report will be sent in this connection.

- 1. P.A to Hon'ble Vice-Chancellor,**
- 2. P.A Pro-Vice-Chancellor,**
- 3. P.A to Registrar,**
- 4. All Deans of all Faculties,**
- 5. P.A to Finance & Account Officers, (F.& A.O),**
- 6. P.A to Director, Board of Examinations and Evaluation,**
- 7. P.A to Director, Innovation, Incubation and Linkages,**
- 8. P.A to Director, Board of Lifelong Learning and Extension (BLLE),**
- 9. The Director, Dept. of Information and Communication Technology (DICT) (CCF & UCC), Vidyanagari,**
- 10. The Director of Board of Student Development,**
- 11. The Director, Department of Students Welfare (DSD),**
- 12. All Deputy Registrar, Examination House,**
- 13. The Deputy Registrars, Finance & Accounts Section,**
- 14. The Assistant Registrar, Administrative sub-Campus Thane,**
- 15. The Assistant Registrar, School of Engg. & Applied Sciences, Kalyan,**
- 16. The Assistant Registrar, Ratnagiri sub-centre, Ratnagiri,**
- 17. The Assistant Registrar, Constituent Colleges Unit,**
- 18. BUCTU,**
- 19. The Receptionist,**
- 20. The Telephone Operator,**
- 21. The Secretary MUASA**

for information.

AC_____

Item No. _____

UNIVERSITY OF MUMBAI



Program: M.Sc.

**Course: Biodiversity, Wildlife
Conservation and Management
(PSBWCM)**

Revised Syllabus for Sem III and IV

(Choice Based Credit System with
effect from the Academic year 2020-2021)

AC _____

Item No. _____

UNIVERSITY OF MUMBAI**Syllabus for Approval**

Sr. No.	Heading	Particulars
1	Title of the Course	Biodiversity, Wildlife Conservation and Management
2	Eligibility for Admission	• B.Sc. in ANY subject or its equivalent. • B.Sc. Veterinary science or its equivalent. • B.Sc. Agriculture or Forestry or its equivalent.
3	Passing Marks	Not Applicable
4	Ordinances / Regulations (if any)	
5	No. of Years / Semesters	Two Years
6	Level	P.G. / U.G. / Diploma / Certificate (Strike out which is not applicable)
7	Pattern	Yearly / Semester (Strike out which is not applicable)
8	Status	New / Revised (Strike out which is not applicable)
9	To be implemented from Academic Year	From Academic Year 2020-2021

Date:

Name of BOS Chairman / Dean : Prin. Dr.D.L.Bharmal

Signature :

SEMESTER III

THEORY

PSBWCM 301: Sustainable development, Molecular Phylogenetics and GMOs (60 lectures)

- Unit 1: Eco-development (15 lectures)
Sustainability of Natural resources
Natural Resource Management (with special reference to Fisheries & Forestry)
Regulations on fishing
 Estimating sustainability of fish populations
 Concept of MSY in marine resources
Regulating forest usage & Minor Forest Produce : Controlled logging and Non Timber Forest Produce (e.g. grazing at Keoladeo / Gir, Fishing in Sunderbans, Mahua collection in Kanha, Tendu (*Diospyros melanoxylon*) leaves collection in Central Indian protected areas etc.) in and around various sanctuaries and national parks in India.
Alternate energy sources, their applications and practice
- Unit 2: Eco-tourism (15 lectures)
Scope of Eco tourism in India
Hospitality & Logistics in Eco-tourism
Planning and executing Eco-tourism
Customized Eco-tours (e.g. Bird watching, Adventure Tourism, Agro-tourism)
Local community's participation in Eco-tourism
Public awareness & Interpretation towards environment
Orienting Corporate Social Responsibility towards environment
- Unit 3: Molecular Evolution and Phylogenetics (15 lectures)
Molecular evolution and Phylogenetics (General Concept and applications)
Amino acid Sequencing and Nucleotide sequencing
Molecular Evolutionary Clock
Neutral theory of molecular evolution
- Unit 4: GMOs and their applications (Agriculture & Animal husbandry) (15 lectures)
Recombinant DNA technology & its applications
Trans-genesis and Genetically Modified Organisms
Ecological effects and Potential threats
Field trials
Some success stories

PSBWCM 302: Acts and laws of Protected Areas and People's Participation in their sustenance (60 lectures)

- Unit 1: Principles and Techniques of Wildlife Management (15 lectures)
Census and enumeration of populations
Prey-predator ratio
Habitat management
Plantations, nesting places
Nesting materials, Hides & shelters
Census & enumeration of species
Improving carrying capacity
Water holes, salt licks, stall feeding,
Controlled grazing, controlled fire
Culling & translocation
Dealing with Human –Wildlife conflicts and Compensating losses

Unit 2: People's participation in managing protected areas (15 lectures)

Integrating Local Community in conservation
Training & skill development of local human resource
People's Biodiversity Register and Critical Wildlife Habitat
Interpretation Centres & Interpretation to visitors
Hospitality & Conducted tours
Resource sharing & income sharing
Case studies of success stories: (e.g. Ranthambor, Periyar, Lakswadweep, Van samitis, Kaziranga, Eagles Nest, Nagaland- Amur Falcon, Andaman- Edible Nest Swiftlets)

Unit 3: Wildlife trade and related organizations (15 lectures)

CITES
TRAFFIC
RED Data Book
Wildlife Crime Control Bureau
Measures to control poaching & wildlife trade

Unit 4: Regulations & Acts related to protected areas (15 lectures)

Wildlife Protection act, 1972
Biodiversity Act, 2002
Forest conservation Act, 1980
Coastal Regulatory Zone notification, 1991
Tribal Rights Act, 2006

PSBWCM 303: Environment Monitoring & Environment Audits (60 lectures)

Unit 1: Monitoring Environment (15 lectures)

Abiotic parameters to be monitored for various types of habitats
Keystone species & Indicator species
Continuous & seasonal monitoring
Various monitoring techniques & methods

Unit 2: Environmental Journalism (15 lectures)

Investigating environmental issues
Important Governmental agencies
RTI and its judicious use
Interacting with affected people
Mass media and its role
 e.g books – Silent spring, Small is beautiful
 films – Home (BBC documentary), Inconvenient truth
Reporting Environmental issues

Unit 3: Environmental Audits & reporting (15 lectures)

Planning environmental audits
Audit parameters: major biotic and abiotic factors
Environment safety audits
Carbon Audits, its significance, applications and practice
Reporting audit findings
Predictive value of audit findings

- Unit 4: Environmental education Techniques (15 lectures)
Need & scope of Environmental Education
Identifying Audience & their needs
 Children, General public, Decision makers
Techniques in environmental education
 Class-room techniques (examples)
 Talks, Nature games, role playing, models,
 Competitions, songs, drama, mass-media etc.
 Field techniques
 For e.g. Surveys, Street plays, demonstrations, Art
 Cultural practices, exhibitions etc.
 Environment education on specific issues (Examples);
 For e.g. Smoke-less chulas, solar cooker, biogas plant, cattle
 immunization etc.

PSBWCM 304: Applications of Information Technology in Field Biology (60 lectures)

- Unit 1: Computational needs in the field (15 lectures)
Field computer & its applications
Using computers in field
 Various field input devices
 Alternate power sources
Managing data integrity & safety in field
- Unit 2: Radio-telemetry (15 lectures)
Various restraining, capture techniques and types of cages for animals.
Various telemetry devices (including data loggers)
Ethics in telemetry applications
Hand held & satellite based systems
Limitations of telemetry observations
Applications of telemetry
 eg. Habitat usage, migration studies
“Digital” tagging & its applications (e.g. implanting micro-chips)
- Unit 3: Audio records (15 lectures)
Various audio recording techniques
Sonogram and its evaluation
Software for sonogram evaluation
Applications of audio recordings
 e.g. (Bird songs, Insect calls, Habitat usage by Bats, Marine mammals)
- Unit 4: GIS and its interpretation (15 lectures)
Principles and Practice of Geographic Information System
Satellite imageries and false colour imaging
GPS and its application in field
Preparation of field maps, vegetation maps

SEMESTER III

PRACTICAL

PSBWCMP301

1. Undertake a survey of Fishermen's village / Tribal village near forest. Use a suitable questionnaire (1) to record the extend of dependence of the community on the natural resource base, (2) to record their pattern of usage of the natural resource, (3) to document the anthropogenic influences on the ecosystem and (4) to suggest ameliorative measures including environment awareness programmes. Apply suitable Statistical tools for tabulating, representing and evaluating both quantitative and qualitative data obtained during the survey. Interpret the results, make a report and submit*. (* Report to be produced at the time of examination for evaluation by examiner).
2. Extraction of DNA from a suitable plant/ Animal material.
3. Problems based phylogenetic maps and Cladograms. (Eg. Describe/Comment on evolutionary history/ patterns in the picture etc.)
4. Identification of a) Techniques of Trangenesis and b) Genetically Modified Organisms, using suitable photographs.
5. Prepare a plan, itinerary & brochure for an eco-tour using simulated data provided (maximum three days & two nights, excluding travel):
 - a) A place of interest from Natural History – e.g. wildlife reserve
 - b) A place of interest from Adventure Tourism – e.g. riverine valley
 - c) A place of interest from Agro-tourism – e.g. an organic farm
6. For a given terrestrial / aquatic ecosystem from a specified protected area in India, construct a food chain and food web with specific species occupying various trophic levels in different habitat types found in that ecosystem. Add a note on the endangered species / habitats and comment on the possible threats to the food chain and food web.

(PSBWCMP302)

1. Using a suitable insect model, apply the capture – recapture technique for enumeration of population size (e.g. rice weevil using - marker pen)
2. Collect an **abandoned** nest of a bird (made of twigs /grass preferably collected after the breeding season). e.g. Bulbul or Crow or Warbler. Carry out the following analysis;
Record the weight of the nest. Gently separate the nesting material one by one and segregate them as per their lengths. Weight each length group separately and note their group total weights. Note down any cushioning material /artificial materials used. Make a frequency table of nesting material lengths & weights. Depict your observations using suitable statistical tools and evaluate your data. Make interpretations regarding preferences in nesting material.
3. Study of Pugmarks: Make plaster cast of pugmark (e.g. of domestic cat or dog). From the plaster cast make measurements and record the same. Trace the pug mark using glass slab and make a record. Take measurements and keep a record. Study the applications of the same.
If possible, repeat the experiment with Plaster cast of pug mark of Tiger / Leopard (take help from Wildlife authority to obtain plaster casts)
4. Study of animal Tracks & signs using photographs or drawings. e.g. pugmarks, foot prints, tracks,

claw marks, browse lines, regurgitates (e.g. owls), hair, burrows, dens, nests etc.

5. Study of excreta/faeces of various animal species using specimens (if feasible) photograph or images. It should include different kinds of excreta eg. Scat, Dropping, Pellet, Dung, spraint, Guano etc. (The concept and significance of coprology should be understood by studying various types of scats and their natural decay process.)

PSBWCMP303

1. Test of Soil samples for; pH, Texture, Total organic content.
2. Rapid Field Test of Soil samples for; pH, Acidity, Alkalinity, Phosphate, Sulphate, Carbonate
3. Test of Water samples: Dissolved Oxygen, BOD, Light Penetration
4. Test of Water samples: Salinity, pH, hardness, Total Dissolved Solids and Total Suspended Solids
5. Using a Simulated data perform the following:-
Classify the data and calculate ecological indices: Dominance index, Shannon-Wiener Index, Similarity Index, Diversity index. Evaluate and interpret each of the index values.
6. Prepare an audio-visual presentation to communicate conservation to the youth & general public on some environment issues (Eg. Destruction of local biodiversity site like mangrove or sea shore or a forest patch, Human-wildlife conflict, Developmental activity that has potential threat to local biodiversity etc.) *
* Students can use open source software to create audio visual presentations.
7. Design a self-guided trail for a nature reserve / biodiversity park and submit a report.

(PSBWCMP304)

1. Identify and study specifications & applications of various telemetric devices
(Photographs or Models or working models and diagrams);
 - Antennae, transmitters (ingestible, implantable, strap-on (attachable) type)
 - Digitized tags (e.g. implantable micro chips)
 - Dart Gun & Tranquilizing agents & there action.
2. Make an audio recording of a song bird. e.g., bulbul, magpie robin, sunbird. Observe and note the activity of the bird while recording the call. Make a sonogram of the recording. Analyze the call and correlate with the behavioural observations. Classify the call as advertisement call, territorial call, alarm call, courtship call etc.
3. Study of various input devises (construction, use and applications) using photographs / models / actual devises, that could be used with a field computer ;
Types of input ports, Imaging devices, audio devices, Telemetric devices, Note pads & scribble pads, pressure devices, Remote control devices, external memory devices etc.
4. Using a hand held GPS instrument locate coordinates of a demarcated field site (Eg. college campus).
5. Prepare a ready reference data base of resources available in the **Public domain** that is useful in field. eg. environment education films, charts & pictures, images, audio-visual presentations, reference articles, books, legal petitions, judgments etc. Make a report that will be ready reckoner.

6. Demonstrate the use of any of the following software platforms by performing basic operational/statistical functions: Maxent/ PAT GEOM/ Rstudio. (Simulated datasets can be used. Basic programming in R should be attempted for simple statistical calculations.) Students should understand the basics of coding and syntax. The application of such platforms in ecosystem modelling should be understood. Simple programs and analysis carried out should be recorded as a report.

SEMESTER IV

PSBWCM 401 to PSBWCM 404: Projects / Internship with Report

The students are required to undertake a project / internship in the last semester which should be for a maximum duration of 180 days. The project/ internship should consist of a minimum of 130 days of field work, followed by minimum of 30 days of report preparation. The area of work will be related to the topics covered under the course and work will be decided by the students in consultation with faculty members. A survey of literature and feasibility studies will be undertaken by the students, who plan to undertake a project, during the third semester or during early part of fourth semester. Those who undertake internship will undertake a background study of the institution / organization where they plan to complete their internship, during the third semester or during early part of fourth semester.

Each project will be supervised by a faculty member or a group of faculty members and experts. The students will be guided time to time during the project. This exercise will provide the students with valuable experience of proper planning, executing, evaluating and reporting a research project. The students should be encouraged to publish the findings (*if possible*).

The faculty / team of experts will advise and monitor the students interning at different institutions or organizations. This exercise will provide the students with valuable experience of planning, executing and reporting various environment / conservation related projects / programmes and field work. The students should be encouraged to interact with NGOs, corporates, governmental agencies, civil society groups both national & international (*if possible*).

Project Planning & Execution

Students are required to submit a detailed proposal for their project / internship program before they start the project / internship.

- The proposal for internship should cover the information of the organisation / institution where the internship is planned, the area of work envisaged during the internships, the timelines of internship, the justification for selecting the site for internship, the probable benefits that are envisaged, the additional skill sets that would be gained and how the internship will help in furthering the knowledge and skills of the student.
- The project proposal should include information pertaining to the area of work proposed, the significance of the proposed work, its national, regional, local relevance, the potential advancement in current knowledge in the area due to the project outcome, the risks, problems and uncertain factors that may hinder the outcome of the proposed project, alternate plans and risk coverage plans, the financial outlay, external agencies / individuals whose experts may be used in the project and the timelines of the proposed work (with a Gantt chart). The final project should correlate with the proposed work and if not, adequate justification needs to be provided for any deviation.

Students are additionally required to get acquainted with following plant families, especially their field identification characteristics.

1. Verbenaceae
2. Apocynaceae
3. Annonaceae

Evaluation:

Internal evaluation: Internship / project carried out during the fourth semester will be evaluated by the research committee / team of experts and by the guiding faculty during its planning, implementation.

External evaluation: Internship / Project carried out during the fourth semester will be evaluated at the end semester examination on the basis of the report submitted, presentation made by the student and viva voce.

QUESTION PAPER PATTERN THEORY

Total Marks – 60

Total duration – two and half hours

Total question – 04

Marks for each question – 15

Coverage of each question – each question will correspond to each unit taught in that semester.

Options – There will be internal options in each question (within 15 marks)

Compulsory questions – All four questions will be compulsory.

PRACTICAL

Total Marks – 50

Total duration – Six hours

Total questions – 05

Distribution of marks – Question No. 1, 2, and 3 –12 marks each (performance & results)

Question No. 4 – Reports of field visits – 10 marks.

Question No. 5 – Viva voce –04 marks

EVALUATION OF PROJECT / INTERNSHIP

Total marks – 200

Distribution of marks:-

Submission of Outline of project- 20 marks

Report – 120 marks, the report must be supported by raw data generated in the project.

Presentation – minimum 20 min. – 40 marks

- Content
- Presentation
- Effective usage of audio-visual aids
- Clarity of concepts
- Application of techniques in the project
- Response to questions
- Over-all impression

Viva voce – 20 marks

Note: The student will submit a written report on the day of evaluation which will include a synopsis of the project / internship, replies to comments by the evaluator with clarifications (if any) and a brief note on the findings / experiences highlighting the following:

- Name of the work
- Agencies collaborated
- Major gains and skills attained
- Important experiences /observations / results
- Over-all impression

SUGGESTED READINGS

Sr. No.	Title	Author	Publisher	Year
1.	Protected Area Update; Newsletter	-----	Kalpavriksh Environment Action Group, Pune , India	Periodical
2.	Zoos in India; Legislation, Policy, Guidelines and Strategy	-----	Central Zoo Authority, New Delhi	2007
3.	Wildlife ecology	Aaron, N.M.	W.H. Freeman Co. San Francisco, U.S.A.	1973
4.	The Book of Indian Birds	Ali, Salim	Oxford University Press, Mumbai	1997
5.	Wildlife Ecology, Conservation and Management	Anthony R.E. Sinclair, John M. Fryxell and Graeme Caughly	Blackwell Publishing, U.S.A.	2006
6.	The Book of Indian Shells.	Apte, Deepak.	Oxford University Press, Mumbai.	
7.	Colorful Atlas on Indian Wildlife Diseases and Disorders	Arora and BipulChakraborty B.M.	IBDC, Lucknow.	2008
8.	Indian Wildlife Yearbook	Arora B. M. , Editor	AIZ & WV, Bareilly and Central Zoo Authority, New Delhi	2002
9.	Dietary Husbandry of Wild Mammalia	Arora, B.M.	AIZ & WV, Bareilly and CZA, New Delhi.	2001
10.	Indian Wildlife Diseases and Disorders.	Arora, B.M.		
11.	Rehabilitation in free living wild animals	Arora, B.M.	AIZ & WV, Bareilly	2007
12.	Reproduction in Wild Mammalia & Conservation	Arora, B.M.	AIZ & WV, Bareilly.	2002
13.	A Text Book of Developmental Biology	Banerjee, S.	IBD, Dehradun	2001
14.	Remote Sensing for Hazard Monitoring and Disaster Assessment	Barett, E.C. and Anton Micallef	Taylor and Francis, London	1991
15.	Statistics in Research	Bernard Ostle and R.W.Mensing		
16.	Wild Animals in Central India	Brander, A.A	Natraj Publisher, Dehradun.	
17.	Method of Statistical Analysis	C.H. Goulden	John Wiley & Sons	
18.	Environmental Impact Assessment	Canter, L. W.	Graw, Mc, , Hill Publication, New York.	

19.	A Text Book of Agricultural Statistics	Chandel S.R.S.,	AchalPrakashanMandir, Kanpur	1999
20.	Introduction to Geographic Information Systems,	Chang – Kang, Tsung	Tata McGraw -Hill Publishing Company Limited, New Delhi	2002
21.	A guide to Chemical Restraint of Wild Animals.	Chowdhury, Sushant and Malik, Pradeep	Natraj Publishers, Dehradun.	
22.	EIA – A Biography	Clark, B. D., Bissel, B. D. and Watheam, P.	School of Forestry and Environment, SHIATS-Deemed University, Allahabad	
23.	The Temple Tiger.	Corbett, Jim	Oxford University Press, New Delhi	2007
24.	Asian Elephant,	Daniel, J.C.	Natraj Publishers, Dehradun	
25.	The Book of Indian Reptiles and Amphibians	Daniel, J.C.	Oxford University Press, Mumbai.	
26.	Resource and Environmental Economics	Fisher, A.C.	New York: John Wiley & Sons	1979
27.	The conservation of plant biodiversity.	Frankal, Otto H., Anthony, A., Brown, D. and Burdon, Jeremy J.	Cambridge University Press	1995
28.	Statistical Methods	G.W. Snedecor and W.G. Cochran		
29.	The Serengeti Lion	George B. Schaller		
30.	Fundamentals of Wildlife Management	Gopal, Rajesh	Justice Home, Allahabad, India.	1992
31.	Encyclopedia of mammals	Grzimek	McGraw Hill Publishing House, New Delhi.	1988
32.	Wild Animals, Their Minds and Manners	Hornaday, W.T.	IBD, Dehradun.	1989
33.	Concepts in Wildlife Management	Hosetti, B.B.	Daya Publishing House, Delhi.	1997
34.	Collection and preservation of animals	Jairajpuri M. S.	Zoological Survey of India	1990
35.	Statistical Ecology	John A. Ludwig & James F. Reynolds	John Wiley & Sons	1988
36.	Handbook of Environment, Forest and Wildlife Protection Laws in India	Justice Kuldip Singh	Natraj Publishers, Dehradun	1998
37.	Biodiversity conservation in managed and protected areas	Katwal/Banerjee	Agrobios, India	2002
38.	Advances in Fish and Wildlife Ecology and Biology	Kaul, B.L.		1999
39.	A Vet in Wilderness	Khan Ali M. G.	Central Zoo Authority, New Delhi	
40.	Modern Textbook of Zoology, Vertebrates.	Kotpal, R.L.	Rastogi Publications, Merrut.	
41.	Remote Sensing and Image Interpretation	Lilleand, T.M. and Kieffer, R.W	John Wiley and Sons	
42.	Wild Animals of India, Burma, Malaya and Tibet	Lydekker, R.,	Natraj Publishers, Dehradun.	

43.	Wildlife Crime	Menon, Vivek and Kumar, Ashok	Natraj Publisher, Dehradun.	1999
44.	Wildlife Issues in a Changing World	Moulton, M. P. & J. Sanderson	St. Lucie Press	1997
45.	A handbook of forestry.	Negi, S.S.	International Book Distributor, Dehradun.	2005
46.	Biodiversity and its conservation in India	Negi, S.S.	Indus Publishing Co., New Delhi.	1993
47.	Manual for Wildlife Management in India	Negi, S.S.		
48.	Fundamentals of Ecology	Odum, Eugene P	Natraj Publishers, Dehradun.	
49.	Applied Anatomy of the Domestic Animals.	Ommer, P.A. and Harshan, K.R.	Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.	
50.	Natural Resource Information for Economic Development	Orris C. Herfindahl	Baltimore: The Johns Hopkins University Press	1969
51.	Watching and Conserving	Oxford Anthology of Indian Wildlife	Oxford University Press, New Delhi.	
52.	Aerial Photography and Image Interpretation for Resource Management.	Paine, D.P.	John Wiley and Sons.	
53.	The Ecology of Wildlife Diseases.	Peter J. Hudson, Annapaola Rizzoli, Bryan T. Grenfell, Hans Heestrbeek and Andy P. Dobson	Oxford University Press, Oxford	2002
54.	Book of Indian Animals.	Prater, S.H.	Bombay Natural History Society, Mumbai.	
55.	Essentials of Conservation Biology	Primack, R.B.	Sinauer Associates, Inc. Sunderland, MA	1998
56.	Principles and Procedures of Statistics (with special reference to Biological Sciences)	R.G. Steel and J.H. Torrie		
57.	A Text Book of Agricultural Statistics	R.Rangaswamy		
58.	Birds of Wetlands and Grasslands	Rahmani, Asad R. & Ugra, Gayatri	Bombay Natural History Society, Mumbai.	
59.	A Handbook of the Management of Animals in Captivity.	Ram BramhaSanyal		1995
60.	Hunting and Shooting	Rangarajan, Mahesh	The Oxford Anthology of Indian Wildlife.	1999
61.	The ecology and evolution of animal behavior	Robert, A.W	Good Year Pub. Co. California, U.S.A.	1979
62.	Wildlife management.	Robert, G.H.	W.H. Freeman and Co., San Francisco, U.S.A.	1978
63.	The Care and Feeding of Infant Orphaned Wild Birds.	S.M.L. Grose.	IBD, Dehradun	

64.	Remote Sensing: Principles and Applications	Sabbins, F.E., Freeman		
65.	Manual of wildlife techniques for India.	Sale, J.B. and Berkmuller, K.	WII, FAO, Dehra Dun, India	1988
66.	A Handbook of the Management of Animals in Captivity.	Sanyal, Ram Bramha		1995
67.	Indian Wildlife Resources Ecology and Development	Sharma, B.D	Daya Publishing House, Delhi	1999
68.	A New Approach to Linear Programming	Sharma, S.D.	Kedarnath, Ramnath and Co. Meerut	1975
69.	Wildlife Ecology, Conservation and Management	Sinclair, Anthony R.E., Fryxell, John M. and Caughly, Graeme	Blackwell Publishing, U.S.A.	2006
70.	Economics of PA's and its effect on biodiversity.	Singh and Vijaykumar.	APH Publishing Corporation, New Delhi.	2001
71.	Text Book of Wildlife Management.	Singh, S.K.	IBDC, Lucknow.	2005
72.	Conserving India's Natural Heritage	Singh, Samar	Natraj Publication, Dehra Dun.	1987
73.	Wildlife and Forest Conservation	Sinha, P.C.	Anmol Publishing Pvt. Ltd., New Delhi.	1998
74.	Mammals Skin.	Sokolov, V.E.	IBD, Dehradun.	1982
75.	Wildlife research and management. Asian and American Approaches	Stephen, H.B. and V.B. Saharia	Oxford University Press, Delhi	1995
76.	Zoogeography of India and Asia.	Tiwari, S.K.	CBS Publisher and Distributors, New Delhi.	
77.	Natural Resource and Environmental Economics	Tony Prato,	Iowa State University Press	1998
78.	Environmental and social impact assessment	Vanclay F. and Bronstein, D.A.	John Wiley & Sons, New York.	1995
79.	Guide for Planning Wildlife Management in Protected Areas and Managed Landscapes	VishwasSawarkar	Natraj Publisher. Dehradun	
80.	Experimental Designs	W.G. Cochran and G.M.Cox		
81.	Parasitic Diseases of Wild Animals.	W.M. Samuel, M.J. Pybus and A.A. Kocan		2005
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