

S-30th May, 2015 AC after Circulars from Circular No.1 & onwards

- 6 -

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CIRCULAR NO.ACAD/SU/Sci./B.Sc. & M.Sc. Syll./5/2015

It is hereby notified for information to all the concerned that, on the recommendation of the Faculty of Science the Academic Council at its meeting held on 30-05-2015 has accepted the **revised semester-wise syllabi as mentioned against their names in the Faculty of Science as under :-**

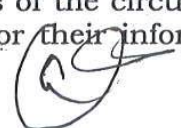
Sr. No.	Name of the Subject	Semester
[1]	B.Sc. Computer Science Degree Course	III & IV
[2]	B.Sc. Information Technology Degree Course	III & IV
[3]	B.C.A. Science Degree Course	III & IV
[4]	B.Sc. Animation Degree Course	III & IV
[5]	B.Sc. Bioinformatics Degree Course	III & IV
[6]	B.Sc. Computer Science [Optional]	III & IV
[7]	B.Sc. Information Technology [Optional]	III & IV
[8]	B.Sc. Computer Applications [Optional]	III & IV
[9]	B.Sc. Computer Maintenance [Optional]	III & IV
[10]	B.Sc. Environmental Science [Optional]	V & VI
[11]	B.Sc. Bio-Chemistry [Optional]	V & VI
[12]	B.Sc. Forensic Science Degree Course	V & VI
[13]	B.Sc. Industrial Chemistry [Optional]	V & VI
[14]	B.Sc. Electronics [Optional]	V & VI
[15]	B.Sc. Zoology [Optional]	V & VI
[16]	B.Sc. Microbiology [Optional]	V & VI
[17]	B.Sc. Instrumentation Practice [Optional]	V & VI
[18]	B.Sc. Statistics [Optional]	V & VI
[19]	B.A. Statistics [Optional]	V & VI
[20]	B.A. / B.Sc. Mathematics [Optional]	V & VI
[21]	B.Sc. Home Science Degree Course	V & VI
[22]	B.Sc. Textile Interior Decoration Degree Course	V & VI
[23]	B.Sc. Fishery Science [Optional]	V & VI
[24]	B.Sc. Dairy Science & Technology [Optional]	V & VI
[25]	B.Sc. Botany [Optional]	V & VI
[26]	B.Sc. Physics [Optional]	V & VI
[27]	M.Sc. Computer Science	III & IV
[28]	M.Sc. I.T.	III & IV

This is effective from the Academic Year 2015-16 & onwards as appended herewith.

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

University Campus,
Aurangabad-431 004.
REF.NO.ACAD/SU/SCI./
2015/3761-4160
Date:- 16-06-2015.

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Director,
Board of College and
University Development.

S-30th May, 2015 AC after Circulars from Circular No.1 & onwards

- 7 -

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Copy forwarded with compliments to:-

- 1] The Principals, affiliated concerned colleges,
Dr. Babasaheb Ambedkar Marathwada University

Copy to :-

- 1] The Controller of Examinations,
- 2] The Director, [E-Suvidha Kendra], in-front of Registrar's Quarter,
Dr. Babasaheb Ambedkar Marathwada University,
- 3] The Superintendent, [B.Sc. Unit],
- 4] The Superintendent, [M.Sc. Unit],
- 5] The Programmer [Computer Unit-1] Examinations,
- 6] The Programmer [Computer Unit-2] Examinations,
- 7] The Record Keeper.

==**==

S*/-160615/-

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.



महाराष्ट्र शासन
ए. आर. जे. आर. मराठवाडा विश्वविद्यालय, अहमदनगर

B.Sc. (Zoology) Semester System

**Third Year (Optional)
(Fifth Semester and Sixth Semester 2015-2016)**

put before
A.C.
1/5/15




Dr. S. S. Shinde

B. D. S. Cherman
Zoology

B. Sc. III Year Zoology

V	ZOL-501	Paper –XV	Ecology		50
	ZOL-502	Pape XVI (Elective)	A	Fishery sciences –I	50
			B	Animal culture –I	
			C	Entomology-I	
			D	Parasitic protozoa & helminthes-I	
			E	Computer Application & Laboratory Technology-I	
			F	Biotechnology-I	
			G	Dairy sciences -I	
			H	Poultry Sciences -I	
	ZOL-503	Paper XVII	Practical based upon Paper XV		50
	ZOL-504	Paper XVIII	Practical based upon Paper XVI		50
VI	ZOL-601	Paper XIX	Evolution		
	ZOL-602	Paper XX	A	Fishery sciences –II	50
			B	Animal culture –II	
			C	Entomology-II	
			D	Parasitic protozoa & helminthes-II	
			E	Computer Application & Laboratory Technology-II	
			F	Biotechnology-II	
			G	Dairy sciences -II	
			H	Poultry Sciences -II	
	ZOL-603	Paper XXI	Practical based upon Paper XIX		50
	ZOL-604	Paper XXII	Practical based upon Paper XX		50

B.Sc. V Semester
Course Code - ZOL- 501
PAPER: XV
ECOLOGY

-
- | | |
|--|----|
| 1. Introduction :- | 02 |
| <ul style="list-style-type: none">➤ Definition, basic concept, terminology used in ecology. | |
| 2. Abiotic environmental factors. | 08 |
| <ul style="list-style-type: none">➤ Temperature; Concept, temperature fluctuation in different environment. Range of temperature tolerance, effect of temperature on animals, Thermal adaptation.➤ Light-Concept, Light variation in different environment, effect of light on animals.➤ Adaptation to salinity and moisture | |
| 3. Biotic environmental factors :- | 08 |
| <ul style="list-style-type: none">➤ Competition: - Definition, types, intraspecific and interspecific composition.➤ Predation: - Definition, characteristics of predation.➤ Commensalisms: - Definition and types with examples.➤ Mutualism: - Definition and example.➤ Parasitism: - Definition and types with examples. | |
| 4. Population :- | 06 |
| <ul style="list-style-type: none">➤ Definition and basic concepts➤ Characteristics of population; Density, Natality, Mortality, Dispersion and Age distribution.➤ Population growth.➤ Population regulation. | |
| 5. Community :- | 06 |
| <ul style="list-style-type: none">➤ Definition, basic concept and types.➤ Structure of community; producer, consumers and decomposers.➤ Characters; ecological niche, diversity, abundance, dominance, ecotone, edge effect.➤ Community succession; example of succession and climax | |
| 6. Ecosystem :- | 15 |
| <ul style="list-style-type: none">➤ Definition, concept and types.➤ Components of ecosystem,➤ Dynamics of ecosystem: - primary production, secondary production, food chain, food web, trophic level, energy flow, ecological pyramids.➤ Brief introduction to major ecosystems: - Marine ecosystem, Pond ecosystem, Forest ecosystem and Desert ecosystem. | |

Total Periods 45



B.Sc. V Semester

Course Code - ZOL- 502

PAPER: XVI - C

**ENTAMOLOGY-I
(Elective Paper)**

ECONOMIC ENTAMOLOGY

I	Introduction to Economic entamology.	03
II	Methods of collection and preservation of insect.	05
III	Type study of grasshopper- systematic position, external morphology, digestive, nervous, reproductive system including development.	08
IV	Insect –orders (general characters)	12
	Thysanura	
	Collembella	
	Lepidoptera	
	Diptera	
	Coeloptera	
	Hymenoptera	
V	House hold and Human insect pest:-	06
	Bed bugs, Mosquito, Rat Flea, and House fly, Cockroach, Pediculus.	
VI	Metamorphosis in insect, types of metamorphosis with example.	05
VII	Insect Culture (gross study) Apiculture, Sericulture and lac culture	06
Total periods		45

B.Sc. V Semester

Course Code - ZOL- 503

PAPER: XVII

ECOLOGY (PRACTICAL)

- | | |
|--|-----------|
| 1. Estimation of productivity of pond ecosystem using white and dark bottle method. | 02 |
| 2. Determine the following parameters of soil. | 04 |
| ➤ pH | |
| ➤ Alkalinity | |
| ➤ Chlorinity | |
| ➤ Salinity | |
| 3. Analysis of DO, CO ₂ , Salinity, Chlorinity of water sample. | 04 |
| 4. Study of animal association ship with example (Charts/photo) -Competition, mutualism, parasitism, predation and commensalisms. | 01 |
| 5. Estimation of population density by Quadrate method on field and by Simulation method. | 04 |
| 6. Preparation of permanent slides of following
<i>Spirogyra, Verticella, Odogonium, Daphnia, Cyclops, Mysis, Cypris, keretella</i> | |
| 7. Project report: - Forest or fresh water ecosystem. | |

Total practical periods: - 15

B.Sc. V Semester

Course Code - ZOO- 504

PAPER: XVIII - C

ENTAMOLOGY – I (PRACTICAL)
(Elective Paper)

1. Collection and preservation of insects	02
2. Dissection –grasshopper-Digestive system, Nervous system, Reproductive system.	03
3. Mounting: - Mouth parts of Grasshopper, Mosquito, Housefly, Cockroach.	02
4. Museum study- five Human insect pest and representatives of orders: Lepidoptera, coleopteran, Odoneta, Hymenoptera, Orthoptera, with examples.	04
5. Collection of insects (at least 15 specimens should be collected and submitted at the time of examination by students)	04
Total practical periods	15

Pattern of Question Paper
B.Sc. V Semester
Course Code - ZOL- 501
PAPER: XV
ECOLOGY

Time: 02:00 hours

Max. Marks: 50

- N.B. 1) Attempt all questions.
2) All question carry equal marks.
3) Illustrate your answer with suitable labeled diagram.

- | | |
|---|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1 to 3
OR
Based on chapter 1 to 3 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 4 & 5
OR
Based on chapter 4 & 5 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 6
OR
Based on chapter 6 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Multiple choice questions:
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

Pattern of Question Paper
B.Sc. V Semester
Course Code - ZOL- 502
PAPER: XVI - C
ENTAMOLOGY - I (Elective Paper)

Time: 02:00 hours

Max. Marks: 50

- N.B. 1) Attempt all questions.
2) All question carry equal marks.
3) Illustrate your answer with suitable labeled diagram.
-

- | | |
|--|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1 to 3
OR
Based on chapter 1 to 3 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 4 & 5
OR
Based on chapter 4 & 5 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 6 & 7
OR
Based on chapter 6 & 7 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Short Questions: (Answer in One Sentence)
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

**B.Sc. VI Semester
Course Code – ZOL - 601
PAPER: XIX
EVOLUTION**

1. Concept of organic evolution :-	06
➤ Definition and concept.	
➤ Theories of organic evolution in brief; Preformation theory, Bear's Law, Biogenetic law, catastrophism, Lamarckism, Darwinism and Germplasm theory.	
2. Origin of Life :-	03
➤ Definition, Abiogenesis, Biogenesis.	
➤ Chemical evolution of life.	
3. Evidences of Organic Evolution :-	04
➤ Anatomical evidences.	
➤ Embryological evidences.	
4. Darwinism :-	05
➤ Introduction :- Natural selection theory,	
➤ Artificial selection theory and sexual selection theory.	
5. Elemental forces of evolution :-	07
➤ Mutation: - Concept and role in evolution.	
➤ Recombination: - Concept and role in evolution.	
➤ Natural selection: - Concept and role in evolution.	
➤ Isolation: - Concept and role in evolution.	
➤ Genetic Drift. : - Concept and role in evolution.	
6. Basic patterns of evolution :-	09
➤ Sequential and divergent evolution.	
➤ Microevolution: - Concept, silent features and mechanism with example.	
➤ Macro evolution: - Concept, silent features and mechanism with example.	
➤ Mega evolution: - Concept, silent features and mechanism with example.	
7. Species and speciation:-	07
➤ Species: - Morphological concept, Genetical concept, biological concept of species	
➤ Speciation: - Definition, concept, mechanism of speciation.	
➤ Allopatric, Sympatric and Parapatric speciation.	
8. Fossils :-	04
➤ Definition , fossil formation	
➤ Types of fossils.	

Total Periods 45

**B.Sc. VI Semester
Course Code - ZOL- 602
PAPER: XX - C
ENTAMOLOGY – II
(Elective Paper)**

PEST MANAGEMENT

I	Pest –Definition, types of pest, agricultural, veterinary and medical pest.	06
II	Study of major crop pest: - Classification, Characters. Jawar- Stem borer, Midge flies Cotton- Red cotton bug, pink bollworm Groundnut-White grub, pod sucking bug Sugarcane- Pyrilla, Stem borer.	12
III	Study of Stored grain pests: Rice weevil, pulse beetle	08
IV	Control measures of insect pest. Methods of control measures-Chemical, Biological, integrated pest management.	08
V	Migration of insect.	03
VI	Insecticides and plant protection appliances like Hand compression spray, Hand rotating duster, bucket pump	08
Total Periods		45

B.Sc. VI Semester
Course Code – ZOL - 603
PAPER: XXI
EVOLUTION (PRACTICAL)

1. Embryological evidences of evolution with the help of slide/chart/pictures.	02
2. Adaptive modification in feet of birds and mouth parts of insects	02
3. Study of successive stages of evolution with the help of models/charts	02
➤ Horse	
➤ Human	
4. Discussion on patterns of speciation with the help of charts /pictures.	02
➤ Allopatric speciation	
➤ Sympatric speciation.	
5. Study the homologous and analogous organs.	04
6. Study of natural selection using <i>E.coli</i> bacteria against antibiotics (Tetramycin/ Penicillin)	01
7. Study of geographical era.	02
Total Practical periods	15

B.Sc. VI Semester Course
Code - ZOL- 604
PAPER: XXII – C
ENTAMOLOGY – II (PRACTICAL)
(Elective Paper)

- | | | |
|--------------------------------|---|-----------|
| 1. | Collection, preservation and identification of Major crop pests (any five) | 05 |
| | Jawar- Stem borer, Midge flies. | |
| | Cotton- Red cotton bug, pink bollworm | |
| | Groundnut-White grub, pod sucking bug | |
| | Sugarcane- Pyrilla, | |
| 2. | Identification of common stored grain pests. | 02 |
| | A- Rice Weevil | |
| | B- Rice beetle | |
| | C- Grain moths | |
| 3. | Study of common plant protection appliances like Sprayers and dusters. | 02 |
| 4. | Collection of major crop pests in locality and submission at the time of examination. | 04 |
| 5. | Visit of an agricultural Field and field study report. | 02 |
| Total Practical Periods | | 15 |

Pattern of Question Paper
B.Sc. VI Semester
Course Code - ZOL- 601
PAPER: XIX
EVOLUTION

Time: 02:00 hours

Max. Marks: 50

- N.B. 1) Attempt all questions.
2) All question carry equal marks.
3) Illustrate your answer with suitable labeled diagram.
-

- | | |
|---|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1 to 4
OR
Based on chapter 1 to 4 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 5 to 6
OR
Based on chapter 5 to 6 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 7 to 8
OR
Based on chapter 7 to 8 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Multiple choice questions:
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

Pattern of Question Paper
B.Sc. VI Semester
Course Code - ZOL- 602
PAPER: XX - C
ENTAMOLOGY – II (Elective Paper)

Time: 02:00 hours

Max. Marks: 50

- N.B. 1) Attempt all questions.
2) All question carry equal marks.
3) Illustrate your answer with suitable labeled diagram.

- | | |
|---|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1 & 2
OR
Based on chapter 1 & 2 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 3 & 4
OR
Based on chapter 3 & 4 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 5 & 6
OR
Based on chapter 5 & 6 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Short Question (Answer in One Sentence):
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

B.Sc. V + VI Semester
Course Code - ZOL- 503 + 603
PAPER: XVII + XXI
ECOLOGY + EVOLUTION (PRACTICAL)

Time: - 4:00 hrs

Total marks:-100

Q.1	Estimation ofof water sample. (DO/ CO ₂ /salinity/Chlorinity) OR Estimation of primary productivity of pond water OR Estimation ofof Soil sample. (Alkalinity / Chlorinity / Salinity)	20
Q.2	study of natural selection of E.coli against.....antibiotics OR Comment on successive stages of evolution of Horse/ man	20
Q.3	Calculate the population density of given sample using Quadrat method. OR Identify and comment on homologous organs and analogous organs. (Any two)	10
Q.4	Identify the given spots and comment on it. (Embryological evidence -01, Adaptive modification- 02, Animal associationship- 02)	25
Q.5	submission of permanent slides (At least five)	10
Q.6	Record book	10
Q.7	Vivo-vice	05

Skeleton of question paper
B.Sc. V+VI Semester
Course Code - ZOL-504 + 604
PAPER: XVIII – C + XXII – C
ENTAMOLOGY – I & II (PRACTICAL)
(Elective Paper)

Time: - 4:00 hrs

Total marks:-100

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- | | |
|--|-----------|
| Q.1 Dissection of -----system of grasshopper. Leave the well labeled Diagram of the same. | 15 |
| Q.2 study of major crop pest | 15 |
| Q.3 Mounting / temporary preparation of supplied material | 10 |
| Q.4 Identify and describe (any five)
(Stored grain pest-03, plant protection appliances-02) | 15 |
| Q.5 Identify and comment on given spots.
(Insect specimen-03, human insect pest-02) | 20 |
| Q.6 submission of collected insect and agricultural and field report | 10 |
| Q.7 record book | 10 |
| Q.8 vivo-vice | 05 |

RECOMMENDED BOOKS

ECOLOGY

- Chapman – Ecology- Cambridge low prize Edition.
- Verma and Agarwal- Principles of ecology
- Koromondy, E.J. Concepts of ecology. Prentice Hall, New Delhi.
- Clarke, G.L. Elements of Ecology, John Wiley & Sons, New York.
- Odum, E.P. -Fundamentals of Ecology. W.B. Saunders, Philadelphia.
- Krebs, C.J. -Ecology. Harper & Row, New York.
- Jorgensen, S.E.- Fundamentals of Ecological modeling. Elsevier, New York.
- P.D. Sharma- Ecology and Environment
- Dutta –Fundamentals of Ecology

EVOLUTION

- Dobzhansky, Th. Genetics and origin of Species. Colombia University Press
- Dobzhansky, Th., F.J. Ayala. G.L. Stebbens and J.M. Valentine.
- Evolution, Surjeet Publication, Delhi.
- Futuyama, D.J. Evolutionary Biology. Sinauer Associates, INS Publishers, Sunderland
- Jha, A.P. Genes and Evolution, John Publication, New Delhi
- King, M. Species Evolution – the role of chromosomal change.
- The Cambridge University Press, Cambridge.
- Merrel, D.J. Evolution and genetics. Oxford University Press, New York
- Strikberger, M.W. Evolution. Jones and Bartett Publishers, Boston, London.
- Moody –An introduction to evolution
- Lull organic evolution
- P.K.Gupta- Ecology, genetics and Evolution
- Savage- Evolution
- Tomer and Singh – organic evolution, Rastogi Publication, merrut

FISHERY SCIENCES-I AND II

- Fish and fisheries of India – V.G Jhingran, Hindustan pub. Cor.india.
- Tropica fish farming- D.K.Belsare, Environmental publication, karad.
- Aquaculture – J.E.Bardach, J.H. Ryther,W.O. McLarney, Wiley Inter science A science of John Wiley and sons INC, New York.
- Text book of Fish Culture – Breeding and Cultivation of Fish- Marcel Huet, Fishing News books ltd. Farhman, Survey, England.

- Fish Farming Hand Book- E.E. Brown and J.B. graatzek. VI Pub.
- Freshwater fish pond culture and management – M. Chakroff Scientific Publisher Jodhpur.
- A text book of aquaculture-M.S. Reddy, Discovery publication house New Delhi.
- Encyclopedia of Fishes and Fisheries in India –A.K. Pandey, G.S. Sandu.Vol.IV Anmol publication ,New Delhi
- Freshwater Aquaculture- R.K.Rathi, Scientific Publisher Jodhpur.
- A Hand Book of fish farming- S.C. Agarwal, Narendra publication house, New Delhi.
- Methods of physico chemical analysis of water- Gottermanet.al.
- Induced breeding of carps – H. Choudhary and S.B.Singh.
- An introduction to fishes- S.S.Khana, central book depot. Allahabad.
- Manual of Methods in Fish Biology- S.P. Biswas, South Asian Publ. new, Delhi.
- Diseases of fish- Van Duiten Jr. Jitte book Landan.

ANIMAL CULTURE [APICULTURE]

- Beekeeping in India – khadi and village industries board gov. of maharastra
- Techniques of bee keeping- CBR and training institute, pune.
- Invertebrate zoology –kotpal
- Anatomy of honeybee- syodross.R.E.

ANIMAL CULTURE [SERICULTURE]

- Hand book of practical sericulture-Narshiihannu and Ullal
- Agro cottage industry – sericulture – C.J.Hiware.
- Tropical sericulture – tazima
- Sericulture manuals- 1st to 4th FAO publication.
- Bulletins of CSR and IT, Mysore

BIOTECHNOLOGY I&II

- Primrose, S. B. and Twyman, R. M., -Principles of Gene Manipulation and Genomics, (7th Ed. 2006), Blackwell Publishing, West Sussex, UK
- Bernard R. and Jack- Molecular Biotechnology: Principles and application of recombinant DNA, ASM Press, Herndon, USA
- R.C.Dubey & Maheshori - Biotechnology, S.Chand Publication
- B.D.Singh- Biotechnology-Himalaya publication
- Verma & Agarwal -Genetic engineering-S.Chand Publication
- Click Molecular Biotechnology
- Mayer R.A.-Molecular biology and Biotechnology
- satyanarayana-biotechnology.-

DAIRY TECHNOLOGY I&II

- S.K.De – outline of Dairy technology
- R.P. Aneja And et.al-Indian milk products,
- P.R.Gupta – Dairy Indian yearbook.(2007)

Dr. S. S. Shinde
B.O.S. Chairman
Zoology