

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

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ಸಹಾಯಕ ಪ್ರಾಚಾರ್ಯರ ಅಧೀನದಲ್ಲಿ ಕಾರ್ಯನಿರ್ವಹಿಸುವುದು.

:- 2 :-

ಕೃಪೆ ಪಡೆದ ಕೃತಿಯನ್ನು ಕೃತಿಯನ್ನು:-

- 1) ಪ್ರಾ. ಪ್ರಿನ್ಸಿಪಲ್, ಅಧಿಕೃತ ಅನುಬಂಧಿತ ಕಾಲೇಜು,  
Dr. Balakrishna Subbanna Mahalingappa University

ಕೃಪೆ ಪಡೆದ:-

- 1) The Controller of Examinations.
- 2) The Director, (B) Studies Kendra, Institute of Technology, Quarters,  
Dr. Balakrishna Subbanna Mahalingappa University,
- 3) The Superintendent, (U.S.S. Unit).
- 4) The Superintendent, (M.S.S. Unit).
- 5) The Programmer (Computer Unit 1) Kuvempu, Kuvempu.
- 6) The Programmer (Computer Unit 2) Kuvempu, Kuvempu.
- 7) The Record Keeper.

07-100615-

**Dr. Babasaheb Ambedkar Marathwada University,  
Aurangabad**

**PHYSICS SYLLABUS**

**B. Sc. III Year**

**Semester V & VI**

**Effective from academic year 2015-16**

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.**  
**B. Sc. III<sup>rd</sup> year Physics Syllabus**  
**(Semester-V and VI)**  
**Revised syllabus from June 2015**

Semester	Course Code	Paper	Title of Paper	Periods	Marks
V	301	XV	Classical & Quantum Mechanics	45	50
V	302	XVI	Electrodynamics	45	50
V	303	XVII	Practical	45	50
V	304	XVIII	Practical	45	50
VI	305	XIX	Atomic, Molecular Physics & Laser	45	50
VI	306	XX	Non-conventional energy sources and Optical fiber	45	50
VI	307	XXI	Practical	45	50
VI	308	XXII	Practical	45	50

**Scheme of practical examination and marks**

Practical examination will be conducted annually

**Practical** : paper XVII+XVIII based on theory paper XV & XVI (50+50= 100 Marks)

**Practical** : paper XXI + XXII based on theory paper XIX & XX (50+50= 100 Marks)

**Experiment** : Paper XVII+XVIII – Experiment 75 marks + Viva-Voce 15 Marks + Record Book/Journals 10 Marks + = 100 Marks

**Experiment** : Paper XXI + XXII - Experiment 70 marks + Viva-Voce 10 Marks + Record Book/Journals 10 Marks + Submission of project report 10 Marks = 100 Marks

**B.Sc. III<sup>rd</sup> year Physics (Semester-V)**  
**Classical and Quantum Mechanics**  
**Course code PHY-301**  
**Paper-XV**

**Period-45**

**Marks-50**

**Chapter 1. Classical Mechanics**

**[11]**

Mechanics of Particle, Mechanics of system of particles Constraints, Classification of Constraints, Virtual Work, D'Alembert's principle, Lagrange's equation, Simple application of Lagrangian formulation –Simple Pendulum, Particle in space, Linear Harmonic Oscillator, Atwood's Machine .

**Chapter 2. Origin of Quantum theory**

**[12]**

Introduction, Failure of Classical mechanics, Black body Radiation (Distribution of Energy), Plank's Quantum theory-Plank's Quantum postulates, linear momentum of photon in terms of wave vector, Plank's radiation law-Wein's law and Rayleigh's law, Einstein's equation: Quantum theory of photoelectric effect, Quantum effect.

**Chapter 3. Wave Particle duality**

**[12]**

Introduction, de-Broglie's hypothesis for matter waves, de-Broglie's wavelength in terms of energy and temperature, de-Broglie phase velocity and particle velocity (relation between them), Group velocity, Relation between group velocity and phase velocity, Davisson-Germer Experiment, Heisenberg uncertainty principle, Applications of Heisenberg uncertainty principle (1) Nonexistence of electrons in nucleus (2) Binding energy of an electron in an atom.

**Chapter 3. The Schrodinger Equation and its applications**

**[10]**

Wave Function ( $\Psi$ ) of a moving particle, Time dependent Schrodinger's wave equation, Expectation value, Operators, Time independent Schrodinger equation (steady state form), particle in one dimensional box, Quantization of energy and momentum.

**Reference Books**

- 1) Classical Mechanics- H- Goldstein
- 2) Classical Mechanics – N.C. Rana and P.S. Joag
- 3) Classical Mechanics – Gupta, Kumar and Sharma
- 4) Introduction of Classical Mechanics – R.G. Takwale & P.S. Puranik.
- 5) Physics for degree student – C.L. Arora, P.S. Hemne (Ist edition S. Chand Publication).
- 6) Quantum Chemistry- Donald Allan Macquarie (Viva-Books Pvt. Ltd.).
- 7) Mathematics for Chemistry- Donald Allan Macquarie (Viva Books Pvt. Ltd.).
- 8) Concepts of Modern Physics - Arthur Beiser, ShobhitMahajan, S. RaiChoudhary (VI<sup>th</sup> Edition- Mc- Graw Hill).
- 9) Perspective of Modern Physics – Arthur Beiser.

**B.Sc. III<sup>rd</sup> year Physics (Semester-V)****Electrodynamics****Course code PHY-302****Paper-XVI****Period-45****Marks-50****Chapter 1. Electrostatics****[12]**

**Introduction :** Electric field lines , electric flux and Gauss law, the divergence of E, Curl of E, Application of Gauss law: i) Electric field due to a uniform charged sphere ii) Electric field due to charged cylinder, Gaussian pillbox, Poisson's equation, Laplace's equation, Uniqueness theorem ( First and Second)

**Chapter 2. Time varying field****[10]**

Faraday's Law of Electromagnetic induction, Lenz's law, Self-Induction, Mutual Induction, equation of continuity, Maxwell's displacement current, Maxwell's equation (Derivation, Differential form)

**Chapter 3. Electromagnetic waves III****[15]**

Origin of electromagnetic waves, characteristics of electromagnetic wave, electromagnetic wave equations in a conducting medium, transverse nature of electromagnetic wave, plane polarized electromagnetic wave, The Poynting Vector, Poynting theorem, Polarization of Electromagnetic waves

**Chapter 4. Interaction of Electromagnetic waves with matter****[08]**

Boundary condition for the electromagnetic field vector  $-\mathbf{B}, \mathbf{E}, \mathbf{D}$  and  $\mathbf{H}$  at the interface between the two media, reflection and refraction at the boundary of two non conducting media.

**Reference Books:**

1. Introduction to Electrodynamics-David J. Griffiths, Third Edition.
2. Mechanics and Electrodynamics - Brijlal N. Subrahmanyam, JivanSeshan
3. Classical Electrodynamics – S.P. Pure
4. Electrodynamics- B.B. Laud
5. Electrodynamics-Gupta, Kumar and Singh, Pragati Prakashan, Meerut
6. Electromagnetic waves and fields –R.N.Singh

**B.Sc. III<sup>rd</sup> year Physics (Semester-V)**

**Practical**

**Course code PHY-303**

**Paper-XXI**

**Period-45**

**Marks-50**

**List of experiments**

1. Measurement of the focal length of a given convex lens using laser
2. Spectral response of photoconductor (LDR)
3. Diffraction of grating using laser beam
4.  $e$  by Millikan's oil drop method
5. Study of thermocouple (Fe-Cu) and to find inversion temperature
6. Refractive Index R.I. of Optical fiber
7. constant of B.G. by standard condenser method
8. study of absorption spectra of iodine and determination of its wavelength using grating

**Note :-** At least Six experiments should be performed.

**B.Sc. III<sup>rd</sup> year Physics (Semester-V)**

**Practical**

**Course code PHY-304**

**Paper-XXII**

**Marks-50**

**List of experiments**

1. Beam divergence of a diode laser
2. Determination of the diameter of a thin wire using laser
3. To study the interference of light using optical fibers
4. Determination of wavelength of He-Ne laser by transmission grating and reflection grating
5.  $\lambda$  by Koenig's method
6. Edser's A pattern
7.  $e/m$  by Thomson methods by Excel
8. Surface tension by Ripple's method

**Note :-** At least Six experiments should be performed.

**B.Sc. III<sup>rd</sup> year Physics (Semester-VI)**  
**Atomic, Molecular Physics and LASER**  
**Course code PHY-305**  
**Paper-XIX**

**Period-45**

**Marks-50**

- Chapter 1. The Atom model** [10]  
Introduction, Thomson atom model, the Rutherford nuclear atom model, drawbacks of Rutherford atomic model, the Bohr's atom model, Bohr's theory of origin of spectral lines, diagrammatic representation of the series spectrum of the H-atom in the light of Bohr's theory.
- Chapter 2. Vector Atom Model** [15]  
Introduction-vector atom model, Quantum numbers associated with the vector atom model, L-S coupling, j-j coupling, The Pauli's exclusion principle, Selection rules, Intensity Rules, Interval Rule, Normal Zeeman effect, Anomalous Zeeman effect, Stark effect and its experimental study.
- Chapter 3. Molecular spectra** [15]  
Introduction, origin of pure rotational spectrum of a molecule, origin of vibration-rotation spectrum of a molecule, Rayleigh's law of scattering, Raman effect-Discovery, experimental study, Applications of Raman effect-molecular structure, Nature of liquids, Crystal Physics, Nuclear Physics, Chemical effects.
- Chapter 4. LASER** [10]  
Introduction, induced absorption, spontaneous emission, stimulated emission, population inversion, properties of laser beam, laser pumping, Types of laser-Ruby laser, He-Ne laser, carbon dioxide (CO<sub>2</sub>) laser, Applications of laser-Biological, medical and industrial.

**Reference Books**

1. Atomic Physics – J.B. Rajam, S. Chand & Company Ltd.
2. Physics for degree students – C.L. Arora, Dr. P.S. Hemne, S. Chand Publication
3. Modern Physics – R. Murugesan, Er. KiruthigaSivaprasath, S. Chand Publication
4. Introduction of Atomic Spectra-white.
5. Fundamentals of Molecular Spectroscopy- C.N. Banwell and E.M. McCash (McGraw Hill International Edition)



**B.Sc. III<sup>rd</sup> year Physics (Semester-VI)**  
**Non-conventional energy sources and Optical fiber**  
**Course code PHY-306**  
**Paper-XX**

**Period-45**

**Marks-50**

**Chapter1. Non-conventional energy sources (12)**

Introduction, Biomass, wind energy, tidal energy/Ocean energy, geothermal energy, biogas hydro energy, wind energy, solar energy  
Biogas plant-fixed dome type

**Wind energy:** Introduction to wind energy, terms and definition: wind, wind farm, wind turbine, vertical axis wind turbine (VAWT), horizontal axis wind turbine (HAWT), propeller (wheel), wind mill, types of wind turbines generator units, monoblade HAWT, twin blade HAWT, merits and limitation of wind energy.

**Chapter 2. Solar Photovoltaic Systems: (10)**

Introduction to photovoltaic systems, Solar Cell fundamentals: i) Semiconductor, ii) P-N junction, iii) Generation of electron-hole pair by photon absorption, iv) I<sub>v</sub>-V characteristics of solar cell

**Electrical storage:** Lead acid battery, basic battery theory

**Chapter 3. Introduction of optical fiber (10)**

Introduction, importance of optical fiber, classification of optical fiber- stepped index fiber, stepped index monomode fiber, Disadvantages of monomode fiber, plastic fiber, latest developed types of optical fibers- HPSUV; HPSIR; Halide; Tapered.

**Chapter4. Fiber cables and fabrication (13)**

**Fiber fabrication:** Classification of fiber fabrication techniques; external chemical vapour deposition (external CVD), axial vapour deposition (AVD), internal chemical vapour deposition (internal CVD)

**Fiber Cables:** Construction, Strength members, cable tensile loading, minimum bend radius losses incurred during installation of cables or during subscriber service testing of cable, selection criteria, optical cable fiber laying in telephone.

**References:**

- 1) Optoelectronics; R. A. Barapate (Tech-Max Publication, Pune)
- 2) Principles of Solar Cells, LEDs and Diodes: The role of the PN junction; ADRIAN KITAI (2011 John Wiley & Sons, Ltd)
- 3) Light Sources: Technologies and Applications; Spiros Kitsinelis (CRC Press Taylo & Francis Group, FL 33487-2742) - 2011
- 4) Energy technology (non-conventional, renewable, and conventional) - S. Rao, Dr. B.B. Parulekar, Khanna Publishers.
- 5) Non-conventional energy resources- B.H. Khan, G.D. Rai, R.P. Khare, II<sup>nd</sup> edition, McGraw Hill Education (India) Private Limited, New Delhi.
- 6) Non-conventional Energy Sources- G.D. Rai, Khanna Publisher
- 7) Solar energy and Rural development- S.H. Pawar, C.D. Lokhande & R.N. Patil
- 8) Solar energy, Fundamentals and applications- Garg, Prakash Tata McGraw Hill
- 9) Fiber Optics and Optoelectronics – R.P. Khare, Oxford University Press.

**B.Sc. III<sup>rd</sup> year Physics (Semester-VI)**  
**Practical**  
**Course code PHY-307**  
**Paper-XVII**

**Marks-50**

**List of experiments**

1. Thermal conductivity by Forb's method
2. Rydberg constant
3. B-H curve using magnetometer
4. Determination of Debye's temperature (e.g. Tin)
5. Determination of dielectric constant of liquid/solid
6. Resistance measurement of semiconductor by Vaders Pau's method
7. I-H Curve by Excel
8. Rydberg constant Excel

**Note:-** At least Six experiments should be performed.

**B.Sc. III<sup>rd</sup> year Physics (Semester-VI)**  
**Practical**  
**Course code PHY-308**  
**Paper-XVIII**

**Marks-50**

**List of experiments**

1. Temperature coefficient of resistance of semiconductor
2. Measurement of thickness of thin film by gravimeter/optical/electrical method
3. Temperature of sodium flame
4. Hartmann's dispersion formula
5. Maxwell's bridge (measurement of inductance using impedance at different frequency)
6.  $\lambda$  by grating (normal incidence)
7. Transistorized Regulated power supply using Zener diode.
8. Bridge Rectifier

**Note:-** At least Six experiments should be performed.

### **Compulsory Activities**

Organize a visit / study tour to Thermoelectric / Hydroelectric Power station, Wind mill, Solar farm and submit project report along with a photograph during the final practical examination.

**OR**

Organize study tour to industry / Research centre and submit a report at the time of final practical examination.

**QUESTION PAPER PATTERN**  
**B.Sc.F.Y.(I & II Semester)**  
**PHYSICS**

**Time : 2.30 Hours**

**Max.Marks :50**

Note:-1.All questions carry equal marks

2.Use of logarithmic table and electronic pocket calculator is allowed.

Q.1.Chapt. I (Long question)

10 Marks

OR

Chapt.II (Long question)

Q.2.Chapt.III (Long question)

10 Marks

OR

Chapt.IV (Long question)

Q.3. a)Chapt. I (Short question)

10 Marks

b)Chapt.II(Short question)

OR

a)Chapt.III (Short question)

b)Chapt.IV (Short question)

Q.4.Attempt any two

10 Marks

a)Chapter I Problem

b)Chapter II Problem

c)Chapter III problem

d)Chapter IV oproblem

Q.5. MCQ

10 Marks

Ten MCQ's having four alternatives based on theory and numerical (Minimum two MCQ's from each chapter)

S-30th May, 2015 AC after Circulars from Circular No.1 &amp; onwards++ - 32 -

**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY****CIRCULAR NO.SU/Sci./B.Sc. Syll./31/2015**

It is hereby notified for information to all the concerned that, on the recommendation of the various Board of Studies, Ad-hoc Boards & Committees the Hon'ble Vice-Chancellor has accepted the **revised semester-wise syllabi in the Faculty of Science as under** on behalf of the Academic Council under Section-14[7] of the Maharashtra Universities Act, 1994 :-

Sr. No.	Name of the Subject	Semester
[1]	B.Sc. Automobile Technology IInd Year, [Three Year Degree Course].	III & IV
[2]	B.Sc. Horticulture IInd Year, [Optional].	III & IV
[3]	B.Sc. Chemistry IIIrd Year, [Optional].	V & VI
[4]	B.Sc. Analytical Chemistry IIIrd Year, [Optional].	V & VI
[5]	B.Sc. Agrochemical & Fertilizer IIIrd Year, [Optional].	V & VI
[6]	B.Sc. Geology IIIrd Year, [Optional].	V & VI
[7]	B.Voc. Multimedia & Animation, [Three Year Degree Course].	I to IV
[8]	B.Voc. [1] Industrial Automation, [2] Automobile & [3] Travel & Tourism, [Three Year Degree Course].	I to VI
[9]	B.Voc. Jewellery Design & Gemology, IInd Year [Three Year Degree Course].	III & IV
[10]	Diploma in Industrial Automation for Community College at University Campus.	

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./  
2015/6860-7259  
Date:- 08-07-2015.

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**Director,**  
**Board of College and**  
**University Development.**

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

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**Copy forwarded with compliments to:-**

- 1] The Director, C.V.E.T., Dr. Babasaheb Ambedkar Marathwada University Campus, Aurangabad.
- 2] 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, [B.C.S. Unit],
  - 5] The Programmer [Computer Unit-1] Examinations,
  - 6] The Programmer [Computer Unit-2] Examinations,
  - 7] The Record Keeper.
- Dr. Babasaheb Ambedkar Marathwada University.

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**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.**

**SYLLABUS**

**B.Sc. (Chemistry)**

**THIRD YEAR**

**SEMESTER SYSTEM**

**FIFTH / SIXTH SEMETER**

**[Effective from – June- 2015 onwards]**

**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGBAD**

**B.Sc. (Chemistry) IN SEMESTER PATTERN FOR THREE YEAR DEGREE**

YEAR	SEMESTER	PAPER NUMBER	PAPER TITLE	Hours	MARKS
First	I	Paper – I	Inorganic Chemistry	45	50
		Paper – II	Organic Chemistry	45	50
		Paper – III	Lab Course I	45	50
	II	Paper – IV	Physical Chemistry	45	50
		Paper – V	Inorganic Chemistry	45	50
		Paper – VI	Lab. Course – II	45	50
Second	III	Paper – VII	Organic Chemistry	45	50
		Paper – VIII	Physical Chemistry	45	50
		Paper – IX	Lab. Course-III	90	100
	IV	Paper – X	Inorganic Chemistry	45	50
		Paper – XI	Physical Chemistry	45	50
		Paper – XII	Lab. Course-IV	90	100
Third	V	Paper – XIII	Physical Chemistry	45	50



		Paper – XIV	Organic Chemistry	45	50
		Paper – XV	Lab. Course-V	90	100
	VI	Paper – XVI	Inorganic Chemistry	45	50
		Paper – XVII	Organic Chemistry	45	50
		Paper – XVIII	Lab. Course-VI	90	100

## **B.Sc. CHEMISTRY**

(Three Year Degree Course)

### **THIRD YEAR**

<b>Paper XIII</b>	<b>Physical Chemistry</b>	<b>Fifth Semester</b>
		<b>(45hrs)</b>
		<b>3 Hrs/ Week</b>
I. Elementary Quantum Mechanics		10 Hrs.
II. Spectroscopy		10 Hrs.
III. Photochemistry		08 Hrs.
IV. Physical Properties and Molecular Structure		10 Hrs.
V. Nano Material		07 Hrs.

<b>Paper XIV</b>	<b>Organic Chemistry</b>	<b>Fifth Semester</b>
		<b>(45hrs)</b>
		<b>3 Hrs/ Week</b>
I. Spectroscopy		16 Hrs.
II. Organometallic Compounds		08 Hrs.
III. Organic Synthesis via Enolates		13 Hrs.
IV. Fats, Oils and Detergents		08 Hrs.

<b>Paper – XV</b>	<b>Lab. Course V</b>	<b>Organic Chemistry and</b>
		<b>(45 Hrs)</b>
		<b>Inorganic Chemistry</b>
		<b>(45 Hrs)</b>

## B.SC. CHEMISTRY

(Three Year Degree Course)

### THIRD YEAR

<b>Paper XVI</b>	<b>Inorganic Chemistry</b>	<b>Sixth Semester</b>
		<b>(45hrs)</b>
		<b>3 Hrs/ Week</b>
I. Metal-ligand Bonding in Transition Metal Complexes		12 Hrs.
II. Electron Spectra of Transition Metal Complexes		07 Hrs.
III. Organometallic Chemistry		10 Hrs.
IV. Bioinorganic Chemistry		10 Hrs.
V. Chromatography		06 Hrs.

<b>Paper XVII</b>	<b>Organic Chemistry</b>	<b>Sixth Semester</b>
		<b>(45hrs)</b>
		<b>3 Hrs/ Week</b>
I. Heterocyclic Compounds		13 Hrs.
II. Carbohydrates		10 Hrs.
III. Synthetic Polymers		07 Hrs.
IV. Synthetic Dyes and Drugs		15Hrs.

<b>Paper – XVIII</b>	<b>Lab. Course VI</b>	<b>Organic Chemistry &amp;</b>
		<b>(45 Hrs)</b>
		<b>Physical Chemistry</b>
		<b>(45 Hrs)</b>

## **B. SC. THIRD YEAR**

### **Paper XIII**

### **Physical Chemistry [ V<sup>th</sup> Semester]**

**45 Hrs. (3 Hrs/week)**

#### **I Elementary Quantum Mechanics**

**10 Hrs.**

Black body radiation, Planck's radiation law, photoelectric effect, Bohr's modes of hydrogen atom (no derivation) and its defects. Compton effect. De Broglie Hypothesis, the Heisenberg's uncertainty principles, Hamiltonian operator, Schrödinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics. Schrödinger wave equation for H-atom, separation into three equations (without derivation), quantum numbers and their importance.

#### **II Spectroscopy**

**10 Hrs.**

Introduction - Electromagnetic radiation, regions of the spectrum, basic features of different spectrometers, statement of the Born-Oppenheimer approximation. Rotational Spectrum - Diatomic molecules, energy levels of a rigid rotor (semi classical principles), selection rule, rotational spectra of rigid diatomic molecule, determination of bond length, numerical problems.

#### **III Photochemistry**

**08 Hrs.**

Introduction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry, Grothus - Drapper law, Stark-Einstein law, Jablonsiki diagram qualitative description of fluorescence, phosphorescence, non-radiative processes (Internal conversion, Intersystem crossing), quantum yield, photosensitized reactions.

#### **IV Physical properties and molecular structure**

**10 Hrs.**

Optical activity and its measurement, dipole moment and its measurement by temperature change method, magnetic property and its measurement by Guoy

balance method, Applications of optical activity, dipole moment and magnetic property for determination of structure of molecule.

## **V Nano Material**

**07 Hrs.**

Introduction to nano-materials Methods of Synthesis - i) High energy ball milling, ii) Physical vapour deposition (PVD) iii) Chemical vapour deposition (CVD) iv) Micro emulsion. Synthesis using micro-organisms and plant extract.

## **B. SC. THIRD YEAR**

### **Paper XIV Organic Chemistry [ V<sup>th</sup> Semester]**

**45 Hrs. (3 Hrs/week)**

#### **I Spectroscopy**

**16 Hrs.**

Nuclear magnetic resonance (NMR) spectroscopy. Proton magnetic resonance (1H NMR) spectroscopy, nuclear shielding and deshielding, chemical shift and molecular structure, spin-spin splitting and coupling constants, areas of signals, interpretation of PMR spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde, 1, 2, 2 tribromoethane, ethyl acetate, toluene and Acetophenone. Problems pertaining to the structure elucidation of simple organic compounds using UV, IR and PMR spectroscopic techniques. (Combine and single  $\lambda$  max using woodwordfischer rule)

#### **II Organometallic Compounds**

**08 Hrs.**

Organomagnesium - compounds: Alkyl Magnesium halides-ethyl magnesium bromide formation, structure and chemical reactions. Organozinc compound-dialkyl zinc formation and chemical reactions, organolithium compound- n-butyllithium formation and chemical reactions.

#### **III Organic Synthesis via Enolates.**

**13 Hrs.**

Defination, Active methylene compounds, Preparation of Aceto acetic ester, (Claisen condensation with Mechanism), Acidity of alpha hydrogen, properties and reactions involving formation of mono, di and unsaturated carboxylic acids, also synthesis of ketone, di ketone, 4-methyl uracil from acetoacetic ester, keto-enol tautomerism. Preparation of diethyl malonate, properties and reactions involved in alkylation, formation of mono, di and unsaturated carboxylic acids, and also synthesis of aminoacid and barbituric acids from diethyl malonate.

#### **IV Fats, oils and detergents**

**08 Hrs.**

Natural fats, edible and industrial oils of vegetable origin, manufacture of soyabean oil by solvent extraction method and isolation and uses of essential oils.

Types of animals fats and oils and definition of saponification value, iodine value, and acid value. Detergents: Definition, Introduction and preparation of sodium alkyl sulphonate, alkyl benzene sulphonate, and amide sulphonate, (one example each), Cleansing action of detergent.

**B. SC. THIRD YEAR**

**Semester V**

**Paper XV**

**Organic Chemistry**

**Lab Course: V**

**Marks: 50**

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Binary Mixture:

**Separation and Identification of both components**

- i) Benzoic Acid +  $\beta$ -naphthol
- ii) Salicylic Acid + P- nitro aniline
- iii)  $\beta$ -naphthol + Acetanilide
- iv) m-nitroaniline + Naphthalene
- v)  $\alpha$ -naphthol + O-nitroaniline
- vi) Cinnamic Acid + Naphthalene
- vii) Salicylic Acid + Naphthalene
- viii)  $\beta$ -naphthol + m-dinitrobenzene
- ix) Cinnamic Acid + P- nitro aniline
- x) Salicylic Acid +  $\beta$ -naphthol



## Inorganic Chemistry

**Lab Course: V**

**Marks : 50**

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1 Inorganic Qualitative Analysis (Semi-Micro Analysis)

(Atleast five mixtures)

2. Separation of calcium and Barium and estimation of

Ca-volumetrically .

3. Separation of Cu and Ni from binary mixture solution and

estimation of Cu-volumetrically .

4. Estimation of oxalic acid and  $H_2SO_4$  in a given mixture

Solution using NaOH and  $KMnO_4$  solution.

5. Estimation of Fe by potassium dichromate using diphenyl

ammine indicator.

6. Estimation of available chlorine in the given sample of

bleaching powder.

7. Separation of calcium and Barium and estimation of

Ba-gravimetrically.

8. Separation of Cu and Ni from binary mixture solution and

estimation of Ni-gravimetrically

## B. SC. THIRD YEAR

### Paper XVI Inorganic Chemistry [ VI<sup>th</sup> Semester]

45 Hrs. (3 Hrs/week)

#### 1. Metal-Ligand Bonding in Transition Metal Complexes 12 Hrs

Limitations of Valence Bond Theory

An Elementary idea of Crystal Field Theory

Crystal Field Splitting in Octahedral, Tetrahedral and

Square Planar Complexes

Factors affecting Crystal Field Parameters

#### 2. Electronic Spectra of Transition Metal Complexes 7 Hrs

Types of Electronic Transitions

Selection rules for d -d transitions

Spectro -chemical series

Orgel Energy level diagram for  $d^1$ ,  $d^5$  and  $d^9$

Electronic Spectrum of  $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$  complex ion.

#### 3. Organometallic Compounds 10 Hrs

Definition, Nomenclature and classification of Organometallic Compounds

Preparation, Properties, Bonding and Applications of alkyls and aryls of - Li,

Al, Hg, Sn and Ti.

A Brief account of metal - ethylenic Complexes

Nature of bonding in metal carbonyls.

#### **4. Bioinorganic Chemistry**

**10 Hrs**

Essential and trace elements in biological processes

Metalloporphyrins with special reference to hemoglobin and myoglobin

Biological role of alkali ( $\text{Na}^+$ ,  $\text{K}^+$ ) and alkaline earth metal ions ( $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ).

Nitrogen fixation

#### **5. Chromatography**

**06 Hrs**

Definition and classification of chromatography

Paper and Thin Layer Chromatography

Method of Development (Ascending, Descending Chromatography)

Locating Technique (UV-light / Chemicals)

R f value

Comparison between paper and TLC

Applications.

## B. SC. THIRD YEAR

### **Paper XVII                  Organic Chemistry [ VI<sup>th</sup> Semester]**

**45 Hrs. (3 Hrs/week)**

#### **1. Heterocyclic Compounds**

**13 Hrs.**

Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine, Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine. Comparison of basicity of pyridine, piperidine and pyrrole. Condensed Heterocycles: Introduction, Preparation of Quinoline (Skraups Synthesis), Isoquinoline (Bischler - Napiralski) and Indole (Fischer indole Synthesis).

#### **2. Carbohydrates**

**10 Hrs.**

Defination, Introduction and Classification.

Monsaccharides-Interconversion of Glucose and Fructose, chain lengthening, chain shortening of aldoses. Conversion of Glucose in to mannose. Determination of openchain structure of glucose & pyranose ring structure of glucose . Mechanism of Mutarotation and Introduction to disaccharides (maltose, sucrose and lactose) and

Polysaccharides (Starch and cellulose) without involving structure determination.

#### **3. Synthetic Polymers.**

**07 Hrs.**

Introduction, Classification based on nature of synthesis (without mechanism) with examples. (Addition and condensation polymers). Properties, uses and synthesis of polyvinyl chloride, polyvinyl acetate, polystyrene, polyacrylonitrile, Nylon 6, Nylon 66. Introduction to synthetic and natural rubber, properties, uses and synthesis of Buna N., Neoprene and silicon rubber.

#### **4. Synthetic Dyes and Drugs**

**15 Hrs.**

Synthetic Dyes - Definition, colour and constitution (electronic concept) of dye, classification based on chemical constitution, synthesis of methyl orange, Congo red, malachite green, crystal violet, Alizarin and indigo dyes.

Synthetic Drugs - Definition, introduction, classification of drugs. Properties of ideal drug. Synthesis of chloromycetin, paracetamol, phenacetin, sulphaguainidine.

**B. SC. THIRD YEAR**

**Semester VI**

**Paper XVIII**

**Organic Chemistry**

**Lab Course: VI**

**Marks: 50**

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**Organic Estimation**

- i) Estimation of Carbonyl group by hydrazone formation method
- ii) Estimation of vitamin C in commercial soft drink / Glucon D
- iii) Estimation of ascorbic acid
- iv) Estimation of Saponification value of oil

**Organic Preparation and its purity by TLC**

- i) Preparation of Hydrazobenzene from azobenzene.
- ii) Preparation of Phthalic anhydride from phthalic acid.
- iii) Preparation of 2, 4 dinitrophenyl hydrazone of acetone.
- iv) To prepare picrate of Naphthalene.
- v) To prepare picrate of Anthracene.
- Vi) preparation of p – bromo acetanilide from acetanilide

## Physical Chemistry

**Lab Course: VI**

**Marks: 50**

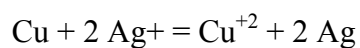
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### Instrumental

1. Determine the Strength of HCl and CH<sub>3</sub>COOH in a given mixture by titrating against strong base conductometrically.
2. Determine the strength of oxalic acid conductometrically using sodium hydroxide solution.
3. To determine empirical formula of ferric -5-sulphosalicylate
4. Determine the amount of Fe<sup>2+</sup> in the given solution potentiometrically
5. To determine the refractive indices of series of salt solutions and to find out concentration of the salt in given unknown solution.

### Non-Instrumental

1. To determine the interfacial tension between two immiscible liquids.
2. To study the effect of addition of an electrolyte NaCl / KCl on the solubility of benzoic acid at room temperature.
3. To determine the standard free energy change  $\Delta G^0$  and equilibrium constant for the reaction.



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S\*/-170615/-

S-30th May, 2015 AC after Circulars from Circular No.1 &amp; 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 :-**

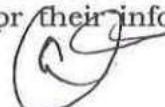
Sr. No.	Name of the Subject	Semester
[1]	B.Sc. Computer Science Degree Course	III & IV
[2]	B.Sc. Information Technology Degree Course	III & IV
[3]	B.C.A. Science Degree Course	III & IV
[4]	B.Sc. Animation Degree Course	III & IV
[5]	B.Sc. Bioinformatics Degree Course	III & IV
[6]	B.Sc. Computer Science [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.**



14/04/2020, 20:53:00: S.M.C. No. 01/01/2020 (Circular No.1) & onward

- 7 -

2

**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, [R. Survidha Kendra], in-charge 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.

887-160016/-



**Syllabus of B. A. / B. Sc. Third  
year (Mathematics) *(with effect)*  
With Effect from June - 2015**

*Handwritten signature*

**DR. B. R. AMBEDKAR MAHATMA UNIVERSITY,  
A. R. NANJANUR  
BOARD OF STUDIES IN MATHEMATICS  
REVISED SYLLABUS FOR THIRD YEAR U.S.S. (MATHEMATICS)  
(With Effect From June - 2015)**

**Semester V**

**Compulsory Papers:**

- Paper - MAT 501: Real Analysis - I
- Paper - MAT 502: Abstract Algebra

**Optional Papers (Any One):**

- Paper - MAT 503: Mathematical Statistics - I
- Paper - MAT 504: Ordinary Differential Equations - I
- Paper - MAT 505: Programming in C++ - I

**Semester VI**

**Compulsory Papers:**

- Paper - MAT 601: Real Analysis - II
- Paper - MAT 602: Abstract Algebra - II

**Optional Papers (Any One):**

- Paper - MAT 603: Mathematical Statistics - II
- Paper - MAT 604: Ordinary Differential Equations - II
- Paper - MAT 605: Programming in C++ - II

**REVISED SYLLABUS FOR THIRD YEAR B.A. (MATHEMATICS)**  
(With Effect From June-2015)

**Semester V**

**Main Papers:**

Paper - MAT 501: Real Algebra - I

Paper - MAT 502: Abstract Algebra - I

**Subsidiary Papers:**

Paper - MAT 503: Mathematical Statistics - I

Paper - MAT 504: Ordinary Differential Equations - I

**Semester VI**

**Main Papers:**

Paper - MA 1001: Real Analysis - II

Paper - MA 1002: Abstract Algebra - II

**Subsidiary Papers:**

Paper - MAT 503: Mathematical Statistics - II

Paper - MAT 504: Ordinary Differential Equations - II

**B. Sc. (Third Year)(Mathematics)(Fifth Semester)****Paper - MAT 501: Real Analysis - I**

Periods : 60

Marks : 50

**1) Prerequisite:**

Sets and elements, Operations on sets.

**2) Functions:**

Mappings, Real valued functions, Continuity, Countability, Real numbers, Least upper bounds [1]

**3) Sequences of Real Numbers:**Definition of sequence and subsequence,  $\epsilon$ - $\delta$  of a sequence, Convergent sequences, Divergent sequences, Bounded sequences, Monotone sequences, Operations on convergent sequences, Cauchy and divergent sequences, Limit superior and limit inferior, Cauchy sequences. [1]**4) Series of Real Numbers:**

Convergent and divergent, Series with non-negative terms, Alternating series, Conditional convergence and absolute convergence, Test for absolute convergence. [1]

**5) Jacobians:**

Definitions, Use of Jacobi of functions, Jacobian of inverse functions, Necessary and sufficient condition for Jacobian to vanish. [2]

**Recommended books:**1. R. R. Goldberg : *Methods of Real Analysis* : Oxford and BHJ Publishing Co. Pvt. Ltd. New Delhi.**Sample:**

Chapter 1 : 1.3(A, B, C, D, E, F, G, H), 1.4(A, B, C, D, E), 1.5(A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z), 1.6(A, B, C, D, E), 1.7(A, B, C, D, E).

Chapter 2 : 2.1(A, B, C, D), 2.2(A, B), 2.3(A, B, C, D), 2.4(A, B, C), 2.5(A, B), 2.6(A, B, C, D, E, F, G, H, I, J), 2.7(A, B, C, D, E, F, G, H, I, J), 2.8(A, B, C, D, E, F, G, H, I, K, L, M), 2.10(A, B, C, D, E), 2.12(A, B).

Chapter 3 : 3.1(A, B, C, D), 3.2(A, B, C, D, E), 3.3(A, B), 3.4(A, B, C), 3.6(A, B, C, D, E, F, G, H, I, J).

2] J. N. Sharma and A. K. Vishishia : *Real Analysis* : Krishna Prakashan Media (P), Ltd Meerut.**Scope:**

Chapter 13 : Articles 1, 2, 3, 4, 5, 6, 7

**References:**1) D. Somasundaram and B. Choudhary : *A First Course in Mathematical Analysis* : Narosa Publishing House, New Delhi.2) Laxi Kishore : *Real Analysis* : Pragati Prakashan, Meerut.3) S. K. Mishra and R. K. Pandey : *Real Analysis* : Pragati Prakashan, Meerut.**Note :** Questions on prerequisites should not be asked.

**B.Sc. (Third Year)(Mathematics)(Fifth Semester)****Paper - MAT 502: Abstract Algebra - I**

Periods : 01

Marks : 50

**1) Prerequisite:**

Set, Functions, Integers.

**2) Group Theory:**

Definition of a group, Some examples- of groups, Some preliminary terms Subgroups, A counting Principle, Normal subgroups and quotient groups Homomorphism, Automorphism. [1]

**3) Ring Theory:**

Definition and examples of rings Some special classes of ring, Ideals and quotient rings- More ideals and quotient rings, Problems 2- 4pg. [1]

**Recommended books:**

1) I. N. Herstein : *Topics in Algebra* : Wiley Eastern Pvt. Ltd., New Delhi.

**Scope:**

**Chapter 2 :** 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7(Cauchy's Theorem for Abelian Groups and Cauchy's Theorem for Abelian Groups are without proof), 2.8.

**Chapter 3 :** 3.1, 3.2, 3.3, 3.5, 3.6(Omit Theorem 3.9.1)

**References:**

- 1) A. K. Yadav: *Modern Algebra* : Krishna Prakashan, Varanasi, Varanasi, India.
- 2) S. C. Khanna : *Modern Algebra* : Sri Prakash, Varanasi, India.
- 3) Vijay K. Khanna and S. K. Bhunia : *A course in Modern Algebra* : Vikas Publishing House Pvt. Ltd, New Delhi.
- 4) Surjit Singh and Qazi Zameeruddin : *Modern Algebra* : Vikas Publishing House Pvt. Ltd, New Delhi.
- 5) Deependra Singh : *Abstract Algebra* : Pragati Prakashan, Meerut.
- 6) Sanku Narayan and Sa. Pal : *A Text book of Modern Abstract Algebra* : S. Chand and Co. Ltd, New Delhi.
- 7) I. N. Herstein : *Abstract Algebra* (Third Edition): Prentice-Hall, Upper Saddle River, New Jersey 07458.
- 8) Joseph A. Gallian : *Contemporary Abstract Algebra* (Seventh Edition) : Brooks/Cole 10 Davis Drive Belmont, CA 94002 - 3098 USA.
- 9) Goyal J. K. and K. P. Gupta : *Advanced course in Abstract Algebra* : Pragati Prakashan, Meerut.
- 10) J. N. Kapour and K. R. Kalra : *Modern Algebra* (Volume I and II): S. Chand and Co. New Delhi.
- 11) S. Mondal : *Topics in Algebra*, All India Publishers Pvt. Ltd., New Delhi.

**Note :** Questions on prerequisites should not be asked.

**Optional Papers (any ONE)**  
**B.Sc. (Third Year)(Mathematics)(Fifth Semester)**  
**Paper – MAT 515: Mathematical Statistics – I**

Periods : 60

Marks : 50

**1) Frequency Distribution and Measures of Central Tendency:**

Frequency distribution, Continuous frequency distribution, graphical representation of a frequency distribution, Histograms, Frequency Polygon, Measures of Central Tendency, Arithmetic mean, Properties of arithmetic mean, merits and demerits of Arithmetic mean, Weighted mean, Median, Merits and demerits of Median, Mode Merits and demerits of mode, Geometric mean, Merits and demerits of Geometric mean, Harmonic mean, partitions [1]

**2) Measure of Dispersion, Skewness and Kurtosis:**

Deviation, Characteristics for an ideal measure of dispersion, Measures of dispersion, Range, Quartile deviation, Mean deviation, Standard Deviation and root mean square deviation, Relation between  $\sigma$  and  $s$ , Different formulae for calculating variance, Variance of the standard series, Coefficient of dispersion, Coefficient of variation, Moments, Relations between moments about mean in terms of moments about any point and vice versa, Effect of change of origin and scale on moments, Pearson's and coefficients, Skewness and kurtosis [1]

**3) Theory of Probability:**

Introduction, Definition of various terms, Axiomatization of Classical Probability, Statistical Probability, Axiomatic approach to probability, Random experiments, Sample space, Events, Venn Diagrams, Algebra of events, Probability – Mathematical Axioms, Probability function, Theorems on Probability of events, Law of addition of Probability, Multiplication law of probability and conditional probability, Independent events, Pairwise independent events, Conditions for mutual independence of events. [1]

**4) Random Variables and Distribution Functions:**

Random Variable, Distribution function, Properties of distribution function, Discrete random variables, Probability mass function, Discrete distribution function, Continuous random variable, Probability density function, Various measures of Central tendency, Continuous distribution function [1]

**Recommended Books:**

[1] S. C. Gupta and V. K. Kapoor : *Fundamentals of Mathematical Statistics* 13<sup>th</sup> Edition  
 Prentice – Hall of India Pvt. Ltd., New Delhi.

**Maps:**

Ch- 2: 2.1, 2.1.1, 2.1.2, 2.1, 2.2, 2.1, 2.3, 2.2, 3, 3.4, 2.5, 2.5.1, 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.6, 2.6.1, 2.7, 2.7.1, 2.8, 2.6.1, 2.9, 2.8.1, 2.11.

Ch- 3: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.7.1, 3.7.2, 3.7.3, 2.8, 2.8.1, 2.9, 3.6.1, 3.9.2, 3.10, 3.13, 3.14

Ch- 4: 4.1, 4.3, 4.3.1, 4.3.2, 4.5, 4.5.1, 4.5.1, 4.5.2, 4.5.1, 4.5.1, 4.6, 4.6.1 (omit 4.4, 4.1), 4.6.2, 4.7, 4.7.1, 4.7.2, 4.7.3, 4.7.4, 4.7.5

Ch- 5: 5.1, 5.2, 5.2.1, 5.3, 5.4.1, 5.3.2, 5.4, 5.4.1, 5.4.2, 5.4.3

**B.Sc. (Third Year) Mathematics)(Fifth Semester)  
Paper – MAT 504: Ordinary Differential Equations – I**

Periods : 04

Marks : 30

**Prerequisite:** Complex numbers

**1) Preliminaries:**

Introduction, Functions, Polynomials, Complex series and the exponential function, Determinants. [3]

**2) Linear Equations of First Order:**

Introduction, Differential Equations, Problems associated with differential equations, Linear equations of the first order. The equation  $y' + py = Q$ , The equation  $y' + py = Q(x)$ , The general linear equation of the first order. [1]

**3) Linear Equations with Constant Coefficients:**

Introduction, The second order homogeneous equation, Initial value problems for second order equations, Linear dependence and independence. A Journal for Writers. The non-homogeneous equation of order two. [2]

**Recommended Book:**

- 1) E. S. A. Coddington : *An Introduction to Ordinary Differential Equations : Practice* Hal. of India Learning Private Limited, New Delhi. (2001). (2009)

**Scope:**

Chapter 0 - Article 1, 4, 5, 6

Chapter 1 - Article 1, 2, 3, 4, 5, 6, 7

Chapter 2 - Article 1, 2, 3, 4, 5, 6

**Reference Books:**

- 1) E.A.Coddington and Levinson Norman : *Theory of Ordinary Differential Equations* : McGraw Hill New York. (1955)
- 2) A.H.Siddiqui and P. Manchanda : *A First Course in Differential Equations with Applications* : Marshall and Jones Ltd. (2006)
- 3) D.G.Zill and M.R.Cullen : *Advanced Engineering Mathematics (Second Edition)* : Jones and Dutton Publishers. (2006)

/ /



**B.Sc. (Third Year)(Mathematics)(Fifth Semester)****Paper MAE 505: Programming in C++ I**

Periods : 45

Marks : 40

**1) Overview of C++ :**

Introduction, Importance of c++, Sample C++ Programs, Basic structure of C++ programs, programming style, Executing a C++ program. [1]

**2) Constants, Variables and Data Types :**

Introduction, Character set, C++ tokens, Keywords and identifiers, Constants, variable, Data types, Declaration of Variables, Storage class Assigning values to variables, Defining symbolic constants, case studies. [1]

**3) Operators and Expressions :**

Introduction, Arithmetic of operators : Relational operators, Logical operators, Assignment operators, Increment and decrement operators, Conditional operators, Bitwise operators, Special operators, Arithmetic expression, Evaluation of expressions, Precedence of arithmetic operators, Some interesting problems, Type conversions in expression, Operator precedence and Associativity, mathematical functions. [1]

**4) Managing Input and Output Operations :**

Introduction, Reading a character, Writing a character, Formatted input, Formatted output. [1]

**Recommended Book :**

1) E. Balagurusamy : *Programming in C++* (Fourth Edition) : 6<sup>th</sup> McGraw Hill

**Scope:**

Ch.1 : 1.1,1.2, 1.3,1.4,1.5, 1.6, 1.8 to 1.10

Ch.2 : 2.1,2.2,2.12, 2.5,2.6,2.7,2.8,2.9,2.10, 2.11

Ch.3 : 3.1 to 3.16

Ch.4 : 4.1 to 4.5

**References:**

1) Y.P. Kanekar : *Let us C++* : DPD Publication

2) Gotfried : *Programming in C++* : Nelson's Series

3) Ericnie, Kuroki : *Spin of "C++"*

4) D. Ravichandran : *Programming in C++* : New Age International Publisher

5) J.Dixie : *Writing C++ Programs*

6) Pradip D. Y and Biswas Ghosh : *Fundamentals of Computing and Programming in C++*

7) V.Rajaraman : *Computer Programming in C++* : PHI Pvt Ltd, New Delhi,2002

**B.Sc. (Third Year)(Mathematics)(Fifth Semester)  
Practical Paper – MAT PR 505(Based on MAT 505)**

Periods : 15

Marks : 10

**List of Experiments/Programs:**

1. Program to find Maximum between two numbers using conditional operator
2. Program to convert Temperature in Fahrenheit into Celsius. ( $C = \frac{5}{9}(F - 32)$ )
3. Program to find addition of two numbers.
4. Program to find square root of a number using sqrt() function.
5. Program to find  $\sin^{-1}$  using pow() function.
6. Program to find simple interest ( $SI = \frac{PRT}{100}$ ).
7. Program to find Area of Circle ( $A = \pi r^2$ )
8. Program to find Circumference of Rectangle ( $C = 2(\text{length} + \text{breadth})$ )
9. Program to find root of Quadratic Equation  $\frac{ax^2 + bx + c}{x}$
10. Program to find Area of Rectangle ( $A = w \times l$ )
11. Program to find circumference of circle
12. Program to find Area of Triangle ( $A = \frac{1}{2} \times b \times h$ )
13. Program to find Area of Square ( $A = s^2$ )
14. Program to find Area of Square ( $A = 4s^2$ )
15. Program to find Area of Circle ( $A = \pi r^2 = \frac{C^2}{4\pi}$ )

**Note:** University Practical Examination will be conducted annually.

**B.Sc. (Third Year)(Mathematics)(Sixth Semester)****Paper – MAT 601: Real Analysis – II**

Periods : 60

Marks : 50

- 1) Limits in Metric Spaces:  
Metric spaces, Limits in metric spaces. [1]
- 2) Continuous Functions on Metric Spaces:  
Functions continuous in metric spaces, open sets, Closed sets. [1]
- 3) Connectedness, Completeness and Compactness:  
More about open sets, connected sets, bounded sets and totally bounded sets, Complete metric spaces. Compact metric spaces. Continuous Functions on compact metric spaces, Uniform continuity. [1]
- 4) Calculus:  
Riemann integrable sets, Definition of Riemann Integral, Existence of Riemann Integral, Fundamental Theorem of Calculus. [1]
- 5) Fourier Series:  
Introduction. [2]

**Recommended books:**

- 1) R. R. Goldberg: *Methods of Real Analysis*: Oxford and MIT Publishing Co. Pvt. Ltd. New Delhi.

**Scope:**

Chapter 1 : 2(A, B, C), 4.3(A, C, D).

Chapter 2 : 1.3(A, B, C, D), 1.4, 1.5(A, B, C, D), 1.6(A, B, C), 1.7(A, B, C), 1.8(A, B, C, D, E), 1.9(A, B, C, D).

Chapter 3 : 3.1(A, B), 3.2(A, B), 3.3(A, B, C, D, E), 3.4(A, B, C, D, E), 3.5(A, B, C, D, E), 3.6(A, B, C, D), 3.7(A, B, C, D, E).

Chapter 4 : 4.1(A, D, C, D), 4.2(A, D, C, D, E, G), 4.3(Theory and Exercise without Proof), 4.4(A, B, C, D, E, F), 4.5(A, B, C, D, E, G).

- 2) D. Somanadham and B. Choudhury: *First Course in Mathematical Analysis* : Narosa Publishing House, New Delhi.

**Scope:**

Chapter III – Arts, pg 10,1

**References:**

- 1) C. N. Sarda and A. R. Varkishu : *Real Analysis* : Krishna Prakashan Media (P), Ltd. Meerut.
- 2) Hari Kishan : *Real Analysis* : Pragati Prakashan, Meerut.
- 3) S. K. Mishra and S. K. Purohit : *Real Analysis* : Pragati Prakashan, Meerut.

**B.Sc. (Third Year)(Mathematics)(Sixth Semester)****Paper - MAJ 602: Abstract Algebra – II**

Periods : 50

Marks : 50

**1) Vector Spaces and Modules:**

Elementary basic concepts of linear independence and bases, Dual Spaces, Inner product spaces, Modules, [1]

**Recommended books:**

1) I. N. Herstein - *Topics in Algebra* : Wiley Eastern Pvt. Ltd., New Delhi.

**Scope:**

Chapter 4 : 4.1, 4.2, 4.3, 4.4, 4.5

**References:**

- 1) A. R. Vasishtha : *Modern Algebra* : Krishna Prakashan, Madh. Pvt. Ltd. Meerut.
- 2) M. L. Khanna : *Modern Algebra* : Jai Prakash Nath and Co. Meerut.
- 3) Vijay K. Khanna and S. K. Bhanbri : *A course in Abstract Algebra* : Vyas Publishing House Pvt. Ltd. New Delhi.
- 4) Anjeet Singh and Qazi Zameeruddin : *Modern Algebra* : Vikas Publishing House Pvt. Ltd. New Delhi.
- 5) Bhupendra Singh : *Advanced Abstract Algebra* : Pragati Prakashan Meerut.
- 6) Shanti Narayan and Sat Pal : *A Text book of Modern Abstract Algebra* : S. Chand and Co. Ltd. New Delhi.
- 7) D. N. S. Pruthi : *Algebra* : Dhanika Coll. Upper Saddle River, New Jersey 07438.
- 8) Joseph A. Gallian : *Contemporary Abstract Algebra* (Seventh Edition) : Brooks/Cole 10 Drive Drive Belmont, CA 94002 – 5098 USA.
- 9) Goyal J. K. and S. P. Gupta : *Advanced course in Abstract Algebra* : Pragati Prakashan, Meerut.
- 10) J. N. Kapoor and S. R. Kalia : *Modern Algebra* (Volume I and II): R. Chaur and Co. New Delhi.
- 11) S. Nanda : *Topics in Algebra*: Allied publishers Pvt. Ltd., New Delhi.

**Optional Papers (any ONE)**  
**B.Sc. (Third Year)(Mathematics)(Sixth Semester)**  
**Paper – MAT 603: Mathematical Statistics – II**

Periods : 60

Marks : 50

**1) Mathematical Expectation, Generating Functions:**

Mathematical expectation, Expectation of a function of a random variable; Addition theorem of expectation, Multiplication theorem of expectation, Expectation of linear combination of random variables, Covariance, Correlation coefficient, Variance of a linear combination of random variables. [1]

**2) Theoretical Discrete Probability Distributions:**

Binomial distribution, moments, Recurrence formulae for the moments of Binomial distribution, Moment generating function of binomial distribution, Addition property of binomial distribution, Corollaries of Binomial distribution, Recurrence relation for moments of Binomial distribution, Poisson distribution, Moments of Poisson distribution, Recurrence relation for moments of Poisson distribution, Moment generating function of Poisson distribution, Corollaries of Poisson distribution, Additive property of independent Poisson variables, Geometric distribution, Law of memory, Moment of geometric distribution, Moment generating function of Geometric distribution. [1]

**3) Theoretical Continuous Distributions:**

Rectangular or Uniform distribution, Moments of rectangular distribution, Moment generating function of rectangular distribution, Normal distribution, Normal distribution as a limiting case of a binomial distribution, Mode of normal distribution, Mean of normal distribution, moment generating function of Normal distribution, Corollaries generating function of Normal distribution, moments of normal distribution, Gamma distribution, Moment generating function of Gamma distribution, Chi-square, Chi-squared generating function of Gamma distribution, additive property of Gamma distribution, Exponential distribution, Moment generating function of exponential distribution. [1]

**4) Correlation and Regression:**

Bivariate distribution, Correlation-Spearman's rho, Karl Pearson's coefficient of correlation, limits of correlation coefficient, Assumptions underlying Karl Pearson's correlation, Regression, Lines of regression, regression curves, Properties of regression coefficients, Angle between two lines of regression. [1]

**Recommended Book:**

J. S. C. Gupta and V. A. Kapoor : *Fundamentals of Mathematical Statistics* (Ninth Edition) : S.Chand and Sons, New Delhi.

**Scope:**

Ch – 6: 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.6.1, 6.7

Ch – 7: 7.1, 7.2.1, 7.2.2, 7.2.6, 7.2.7, 7.2.9, 7.2.10, 7.3, 7.3.1, 7.3.4, 7.3.5, 7.3.7, 7.3.8, 7.5, 7.5.1, 7.5.2, 7.5.2

Ch – 8: 8.1, 8.1.1, 8.1.3, 8.2, 8.3.1, 8.3.3, 8.3.4, 8.3.5, 8.3.5, 8.2.6, 8.2.7, 8.5, 8.3.1, 8.3.2, 8.3.1, 8.6, 8.6.1

Ch – 10: 10.1, 10.2, 10.3, 10.3.1, 10.3.2, 10.3, 10.3.1, 10.3.2, 10.3.3, 10.3.4, 10.3.5

**B.Sc. (Third Year)(Mathematics)(Sixth Semester)****Paper : MAT 604: Ordinary Differential Equations -II**

Periods : 60

Marks : 50

**1) Linear Equations with Variable Coefficients:**

Introduction, Euler's and Cauchy's form for the homogeneous equation, Solution of homogeneous equation, The Wronskian and linear independence, Reduction of the order of a homogeneous equation, The nonhomogeneous equation, Homogeneous equation with analytic coefficients, The Legendre equation. [1]

**2) Linear Equations with Regular Singular Points:**

Introduction, The Euler equation, Second order equations with regular singular points- an example, Second order equations with regular singular points- the general case, The Bessel equation. [ 2 ]

**Recommended Books:**

1) E. A. Coddington : *An Introduction to Ordinary Differential Equations* . Prentice India Learning Private Limited, New Delhi-110001. (2005)

**Scope:**

Chapter 3. Article 1,2,3,4,5,6,7,8

Chapter 6. Article 1,2,3,4,5

**Reference Books:**

1) E. A. Coddington and Levinson Norman : *Theory of Ordinary Differential Equations* : McGraw-Hill New York, (1955)

2) A. H. Siddiqui and P. Marudani : *A First Course in Differential Equations with Applications* : Macmillan India Ltd., (2006)

3) D.C. Zill and M.R. Allen : *Advanced Engineering Mathematics (Second Edition)* : Jones and Harcourt Publishers, (2000)

**B.Sc. (Third Year)(Mathematics)(Sixth Semester)****Paper – MAT 605: Programming in C – II**

Periods : 45

Marks : 40

**1) Decision Making and Branching:**

Introduction, Decision making with If statement, Simple If statement, The Else statement, Nesting of Else statement, The else if block, The switch statement, The ? Operator, The goto statement. [1]

**2) Decision Making and Looping:**

Introduction, The while statement, The do statement, The for statement, Jumps in loops [1]

**3) Arrays:**

Introduction, One dimensional arrays, Declaration, Initialization, Two dimensional arrays, Initializing two-dimensional arrays, Multidimensional arrays. [1]

**Recommended Book :**

1) I. Balagurusamy : *Programming in ANM C* (Second Edition) : Tata McGraw Hill

**Scope:**

CE – 5 : 5 : 1 to 5.9

CO – 5 : 6 : 1 to 6.6

LO – 5 : 7 : 1 to 7.7

**References:**

1) Y.P. Kanerkar : *Let us C* : O.P.J. Publications

2) Anitha : *Programming in C* : Nelson's Series

3) Abdulah Khamar : *Spine of C*

4) D. Kaviratnam : *Programming in C* : New-Age International Publisher

5) R. Ivell : *Mastering C Programs*

6) Fredy D. Y and Miras Ghosh : *Fundamentals of Computing and Programming in C*

7) M.Rajarama : *Computer Programming in C* : PHI Pvt Ltd, New Delhi (2005)

**Note:** (i) There should be annual practical based on Paper : MAT 505 and MAT 605 of 20 Marks in Yearly Practical Examination

(ii) There should be separate passing for Theory and Practical.



Dr. H. R. Srinivasa  
(Chairman, Board of Studies in Mathematics)

**B.Sc. (Third Year)(Mathematics)(Sixth Semester)  
Practical Paper – MAT-III 605(Based on MAT 605)**

Periods : 15

Marks : 60

**List of Experiments/Programs**

1. Program to find minimum between two number using if.
2. Program to Calculate factorial of a number.
3. Program to check given number is prime or not.
4. Program to check given number is Armstrong or not. ( $153 = 1^3 + 5^3 + 3^3$ )
5. Program to find a terms of Fibonaci Series (1, 1, 2, 3, 5, 8, 13, 21, ...)
6. Program to find a terms of the Series,

$$\sum_{n=1}^{\infty} \frac{1}{2^n} = \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots$$

7. Program to Sort any to 4 any Elements
8. Program to Calculate Addition/Subtraction of two Matrices
9. Program to calculate multiplication of two matrices
10. Program to calculate Determinant of Matrix
11. Program to find Transpose of a Matrix.
12. Program to check given year is Leap or not.
13. Program to find sum of series 1 to n.
14. Program to Calculate Grade of Student by inputting Percentage of the student.
15. Program to Check given number's palindromic or not (ex. 12321)

**Note: University Practical Examination will be conducted annually.**



Controller of Examinations



**PRACTICAL QUESTION FORMAT****(MAT-PR-505 & 605) (20 Marks)****Max. Time : Three Hours**

- |   |                  |
|---|------------------|
| <b>Q.1. Record Book</b>   | <b>05 Marks.</b> |
| <b>Q.2. Oral (Viva)</b>   | <b>05 Marks.</b> |
| <b>Q.3. Write/Edit/Print a program in C<br/>(Based on MAT-505&amp; 605)</b> | <b>10 Marks.</b> |
| <b>C++</b>  |                  |
| <b>Q.4. Write/Edit/Print a program in C<br/>(Based on MAT-505&amp; 605)</b> | <b>10 Marks.</b> |



**Dr. Bhanshah Sontakhe**  
**Chairman,**  
**BCS in Mathematics**

S-30th May, 2015 AC after Circulars from Circular No.1 &amp; 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>B.Sc. Zoology [Optional]</b>	<b>V &amp; VI</b>
[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.**

15-50th May, 20: 5:00:00 for circulation from Director Sec.1 & onwards - 7 -

2

**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, [B Survidha Kendra], in-honour 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.

15/500015/-

**Dr. Babasaheb Ambedkar Marathwada  
University, Aurangabad.**



**विद्यया ऽमृतमश्नुते**  
**विद्या ऽमृतमश्नुते**

**B.Sc. (Zoology) Semester System**

**Third Year (Opt./General)**

**(Fifth Semester and Sixth Semester 2015-2016)**

*प्रतिबद्ध*  
*अ.स.*  
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### B. Sc. III Year Zoology

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

**B.Sc. V Semester  
Course Code - ZOL- 504  
PAPER: XV  
ECOLOGY**

<b>1</b>	<b>Introduction :-</b> ➤ Definition, basic concept, terminology used in ecology.	<b>02</b>
<b>2</b>	<b>Abiotic environmental factors.</b> ➤ 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	<b>06</b>
<b>3</b>	<b>Biotic environmental factors :-</b> ➤ Competition: - Definition, types, intraspecific and interspecific competition ➤ Predation - Definition, characteristics of predation. ➤ Commensalism: - Definition and types with examples ➤ Mutualism: - Definition and examples ➤ Parasitism: - Definition and types with examples.	<b>08</b>
<b>4</b>	<b>Population :-</b> ➤ Definition and basic concepts ➤ Characteristics of population: Density, Natality, Mortality, Dispersal and Age distribution. ➤ Population growth. ➤ Population regulation.	<b>06</b>
<b>5</b>	<b>Community :-</b> ➤ Definition, basic concept and types ➤ Structure of community, producer, consumers and decomposers. ➤ Characters; ecological niche, diversity, abundance, dominance, coexistence, edge effect. ➤ Community succession; example of succession and climax	<b>06</b>
<b>6</b>	<b>Ecosystem :-</b> ➤ Definition, concept and types ➤ Components of ecosystem. ➤ Dynamics of ecosystem - primary production, secondary production, food chain, food web, trophic level, energy of flow, ecological pyramids. ➤ Brief introduction to major ecosystems: - Marine ecosystem, Freshwater ecosystem, Forest ecosystem and Desert ecosystem	<b>15</b>

Total Periods    **45**

**B.Sc. V Semester**  
**Course Code - ZOH- 502**  
**PAPER: XVI -A**  
**FISHERY SCIENCE - I**  
**(Elective Paper)**

**CAPTURE FISHERIES IN INDIA**

1.	<b>Introduction</b> Definition and history General characters and classification Concept of blue revolution Importance of fishes.	05
2.	<b>Freshwater Fisheries.</b> Status of freshwater fisheries, past, present and future Freshwater capture fisheries, sea fishery route. Effect of aquatic pollution on fisheries	10
3.	<b>Rivering and reservoir fisheries.</b> Major river systems of India Important fisheries of Indian river system Major reservoirs of Maharashtra Reservoir fisheries and its management. Exploitation of reservoir fisheries	10
4.	<b>Brackish water fisheries</b> Principle fisheries of brackish water: milkfish, mullet, tilapia Fisheries of the Chilka, pulicat, and Kolleru Lake	06
5.	<b>Marine water fisheries.</b> Oil-seedling Mackerel Ribbon fish fisheries. Bombay-duck Pomfret-fishery	08
6.	<b>Application of remote sensing technique in pelagic fisheries.</b>	04
	<b>Total periods</b>	<b>45</b>



B.Sc. V Semester

Course Code - ZOL- 502

PAPER: XVI -- B

ANIMAL CULTURE - I

(Elective Paper)

<b>APICULTURE</b>		
1.	Introduction and history	02
2.	Status, problems and prospects of Bee-keeping practices	02
3.	Systematic position and distribution of different honey bees.	05
	a) Wild species	
	b) Domesticated species	
	c) Brief account of honey production	
4.	Organization in colony and polymorphism in Wild species: Caste differentiation Division of work	06
5.	Life cycle of honey bees	06
6.	Morphology of queen, worker and drone	08
6.	Behavior of domesticated bees:	08
	a) Nesting behavior	
	c) Swarming and colony production	
	e) Communication	
	d) Defense, foraging	
	e) Mating	
	f) Comb construction	
	g) Humidity and temperature control	
7.	Food plants and plant-bee relations.	04
	a) Pollination by honey bees	
8.	Disease, pests, parasites and predators of bees and their control.	08
	a) Protozoan disease-Nosema	
	Bacterial disease - American and European foul brood	
	Viral disease- sac brood	
	Fungal disease- chalk brood and stone brood	
	b) External mites and dipterans, internal mites	
	c) Flies - wasps	
	d) predators - wasps, lizards, rats, lizard, mantis, bears etc	
	e) Poisoning and pesticides: hazards in bees	
9.	Bee products and their uses	03
	<b>Total periods</b>	<b>45</b>





B.Sc. V Semester

Course Code - ZOL- 502

PAPER: XVI - C

ENTOMOLOGY-I

(Elective Paper)

**ECONOMIC ENTOMOLOGY**

I	Introduction to Economic entomology.	03
II	Methods of collection and preservation of insect.	05
III	Type study of grasshopper- systematic position, external morphology, digestive, nervous, reproductive systems including development.	08
IV	Insect -orders (general characters)	12
	Thysanura	
	Collembola	
	Isopods	
	Diptera	
	Coeloptera	
	Hymenoptera	
V	House hold and Human insect pest-	06
	Red bugs, Mosquito, Rat Flea, and House fly, Cockroach, Bedbug	
VI	Metamorphosis in insect types of metamorphosis with example	05
VII	Insect Culture (grass study); Apiculture, Sericulture and lac culture	06
	<b>Total periods</b>	<b>45</b>

**B.Sc. V Semester**

**Course Code - ZOL- 502**

**PAPER: XVI – D**

**PARASITIC PROTOZOA AND HELMINTHES - I**  
**(Elective Paper)**

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**A- PARASITIC PROTOZOA**

1. Introduction to parasitology : Definition Parasite & Host. Parasitism.	05
Types of parasites, host-parasite relationship	
2. Classification of protozoan parasites	02
3. Structure, life cycle, Pathogenicity and control measure of the following:	
➤ <i>Entamoeba coli</i>	03
➤ <i>Entamoeba gingivalis</i>	03
➤ <i>Giardia intestinalis</i>	03
➤ <i>Ixonotomonas vaguans</i>	04
➤ <i>Trypanosoma gambiense</i>	04
➤ <i>Balantidium coli</i>	03
➤ <i>Plasmodium vivax</i>	04
➤ <i>Plasmodium falciparum</i>	04
➤ <i>Plasmodium ovale</i>	04
➤ <i>Plasmodium malariae</i>	03
➤ <i>Eimeria tenella</i>	03
<b>Total Periods</b>	<b>45</b>



**B.Sc. V Semester**

**Course Code - ZOL- M02**

**PAPER: XVI – E**

**COMPUTER APPLICATION AND MEDICAL LABORATORY TECHNOLOGY-1  
(Elective Paper)**

**A- COMPUTER APPLICATION**

1. History of computer and their application to biology.	03
2. Operating systems DOS, WINDOWS: Windows XP, Windows 7, and UNIX	07
3. System Units: Mother board, Microprocessor and memory.	08
4. Storage Devices, Input/ output devices.	04
5. Microsoft office (2007): MS-word, MS-Power point, MS- Excel, MS- Publisher	06
6. Internet: Basics, Internet services, WWW services, E-mail services. Search engines.	05
7. Demonstration on of web utilities in biology.	05
8. C++- introduction to programming.	01
9. Programming using 'C'.	02
10.'C' Data types.	03
11-Simple programs using C.	05

**Total Periods 46**



## B.Sc. V Semester

Course Code - ZOL- 502

PAPER: XVI - F

## BIOTECHNOLOGY - I

(Elective Paper)

1. Introduction to biotechnology Definition and concept Old and new biotechnology Scope and Importance, Biotechnology in India.	03
2. Genetic engineering Concept and definition Steps involved in gene cloning Application	04
3. Isolation & amplification of desired gene Isolation of DNA from cell Genomic library, cDNA library In vitro synthesis of gene Polymerase chain reaction	04
4. Enzymes in gene cloning Restriction enzymes (Nomenclature, types) DNA Ligase, Taq polymerase, alkaline phosphatase Polymerase etc	04
5. Cloning vectors Plasmid, bacteriophage, cosmid YAC, BAC, shuttle vector, Agro bacterium etc	04
6. Gene transfer methods Transformation, conjugation, Electroporation, transfection Liposome mediated gene transfer, Gene gun, microinjection etc	05
7. Screening of cloned genes Direct selection, Insertional inactivation method Immunological assay, Autoradiography Colony and plaque cloning	05
8. Problems and solutions for gene cloning	02
<b>Total periods</b>	<b>45</b>



## B.Sc. V Semester

Course Code - ZOL- 502

PAPER: XVI - G

## DAIRY TECHNOLOGY - I

(Elective Paper)

1. Milk-Definition, Composition, Factors affecting composition of milk	05	
> Food and Nutritive value of milk		
> Physico-chemical properties of milk		
2. Microbiology of milk:-Introduction	06	
> Growth and Destruction of microorganisms		
> Classification of microorganisms		
3. Milk and public health: Introduction	03	
> Safe guarding of milk supply		
> Clean milk production		
4. Buying and collection of milk :-	04	
> Introduction, Method of buying, Method of collection		
> Cooling of milk		
> Transportation of milk		
5. Manufacture, Packaging and storage of Pasteurized milk :-	08	
> Introduction, Milk reception operation, Standardization		
> Pasteurization, Homogenization		
> Packing and storage of milk		
6. Judging and grading of milk, Introduction	02	
> Importance and procedures		
7. Indian dairy products :-	04	
> Introduction		
> Importance and Classification		
8. Khoa :-		
> Introduction, definition classification and Composition		
> Food and Nutritive Value		
> Methods of production and defects of khoa		
9. Channa :-	04	
> Introduction, definition and Composition		
> Channa Based sweets, Food and Nutritive Value		
> Methods of production		
10. Dahi	04	
> Introduction, definition and Composition		
> Channa Based sweets, Food and Nutritive Value		
> Methods of production		
	<b>Total Periods</b>	<b>45</b>

**H.Sc. V Semester**

**Course Code - ZOL- 602**

**PAPER: XVI - H**

**POULTRY SCIENCE-I**

**{Elective Paper}**

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1. Introduction to poultry science.	02
2. Classification of poultry breeds:	08
> American	
> Asiatic	
> English	
> Mediterranean.	
3. Digestive, circulatory, Respiratory and Male and female reproductive system of poultry.	16
4. Formation, structure and nutrition value of eggs.	08
5. Breeding of poultry,	19
> Selection	
> Objective	
> Methods of Selection	
> Mating system.	
6. Management of incubation	02
7. Hatching of eggs.	02
	<b>Total Periods 45</b>

B.Sc. V Semester

Course Code - ZOL- 503

PAPER: XVII

**ECOLOGY (PRACTICAL)**

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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<sub>2</sub>, Salinity, Chlorinity of water sample. 04
4. Study of animal association ship with example (Chama)photo) -Competition, mutualism, parasitism, predation and commensalism. 04
5. Estimation of population density by Quadrats method on field and by Simulation method 04
6. Preparation of permanent slides of following  
Spirogyra, Volvella, Oedogonium, Daphnia, Cyclops, Myxos, Cerans, Keratella
7. Project report - Forest or fresh water ecosystem

Total practical periods: - 15

B.Sc. V Semester

Course Code - ZOL- 504

PAPER: XVIII - A

FISHERY SCIENCE – I (PRACTICAL)  
(Elective Paper)

1.	Study of freshwater fishes. Major carps Other carps. Cat fishes Clupeoidea	03
2.	Study of brackish water fishes  Hilsa hilsa, Chanos chanos (milkfish), Lates calcarifer, Tilapia	02
3.	Study of marine water fishes. O'ardine Maskers Ribbon-fish Bombay-suck Pomfret Sole Polynogus	08
4.	Water analysis	05
5.	Visit to local or any reservoir and marine fish landing centre and student should be assign : a project report at the time of practical examination	02
Total practical periods :-		15





**B.Sc. V Semester**

**Course Code - ZOL-504**

**PAPER: XVIII - B**

**ANIMAL CULTURE - I (PRACTICAL)  
(Elective Paper)**

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1.	Identification of members of bee family	02
2.	Study of bee hive	02
3.	Study of different types of bees.	02
4.	Mounting of mouth parts and sting apparatus of honey colony	04
5.	Identification of different types of hives and equipment used in apiculture.	04

**Total practical periods: - 15**



**B.Sc. V Semester**

**Course Code - ZOO- 504**

**PAPER: XVIII - C**

**ENTOMOLOGY – I (PRACTICAL)**

**(Elective Paper)**

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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- fix: Human insect pest and representatives of orders: Lepidoptera, coleoptera, 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
<b>Total practical periods</b>	<b>15</b>



B.Sc. V Semester

Course Code - ZOO- 604

PAPER: XVIII - D

**PARASITIC PROTOZOA AND HELMINTHES – I (PRACTICAL)**  
**(Elective Paper)**

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Parasitic protozoa

- |  |    |
|--|----|
| 1. Study of microscopic structure of the following:  | 03 |
| • <i>Eukaryotes</i> spp  |    |
| • <i>Colpoxanthus</i> <i>Nyctophora</i>  |    |
| • <i>Oocystis</i>  |    |
| • <i>Nyctophora</i>  |    |
| • <i>Balantidium</i> <i>oxi</i>  |    |
| • <i>Trichomonas</i> species   |    |
| • <i>Trypanosoma</i> species   |    |
| • <i>Plasmodium</i> species  |    |
| • <i>Eimeria</i> species.  |    |
| 2. Smear preparation: - Rat's Fish blood smear (Giemsa stain)  | 04 |
| 3. Flagellate parasite from rectum of frog and Cuticles with giemsa stain.   | 04 |
| 4. Ciliated parasite from rectum of frog - smear with iron haematoxylin or iron<br>phosphoric acid for <i>Balantidium Nyctophora</i> and <i>Oocystis</i> . | 04 |

Total practical periods: = 15

**B.Sc. V Semester**

**Course Code – ZOO - 504**

**PAPER: XVIII – E**

**COMPUTER APPLICATION AND MEDICAL LABORATORY TECHNOLOGY- I (Practical)  
(Elective Paper)**

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- |  |           |
|--|-----------|
| 1. Demonstration of the use of the following devices:<br>Visual Display Unit (VDU), Key board, Mouse, Light pen, Joystick, Printers,<br>Plotters, Links, CD-Rom. | <b>03</b> |
| 2. Use of DOS and windows- manipulating files  | <b>02</b> |
| 3. Use of internet - demonstration of various web sites related to biology.  | <b>05</b> |
| 4. Introduction to programming, editing files, programming in 'C'  | <b>05</b> |

**Total practical periods: • 15**



**B.Sc. V Semester**

**Course Code – ZOO - 504**

**PAPER: XVIII – F**

**BIOTECHNOLOGY – I (PRACTICAL)**  
**(Elective Paper)**

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A) Principle and application of following equipments	04
1) gel electrophoresis	
2) column chromatography	
3) high pressure liquid chromatography	
4) centrifuge	
5) laminar flow	
6) spectrophotometer	
B) Estimation of total DNA from animal tissue using Diphenylamine method	02
C) Estimation of total RNA from animal tissue using orcinol method	02
D) Isolation of messenger RNA from animal source using affinity chromatography	02
E) Isolation of total DNA from tissue	01
F) DNA electrophoresis by agarose gel	02
G) Demonstration of Automated methods of following	02
• Gene cloning	
• Restriction digestion of DNA	
• Southern blotting techniques	
• Northern blotting technique	

**Total practical periods                    16**

B.Sc. V Semester

Course Code - ZOO-604

PAPER: XVIII – G

**DAIRY TECHNOLOGY- I (PRACTICAL)**  
**(Elective Paper)**

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1. Study of steps for clean and safe milk production.	<b>01</b>
2. Sampling of milk	<b>01</b>
3. Platform test for judging the quality of milk;	<b>01</b>
✓ Organoleptic test	
✓ Temperature	
✓ COB test	
✓ Alcohol test	
✓ Sediment test.	
4. Determination of fat of milk	<b>01</b>
5. Determination of SNF and TS of milk.	<b>01</b>
6. Determination of Specific gravity of milk	<b>01</b>
7. Determination of acidity and pH of milk.	<b>01</b>
8. Staining of Bacteria.	<b>02</b>
9. Methylene blue reduction test (MBR) for milk.	<b>01</b>
10. Standard plate count (SPC) of milk. Detection of adulterants and preservative in milk	<b>01</b>
11. Preparation of Lassi.	<b>01</b>
12. Preparation of Chhena	<b>01</b>
13. Preparation of Dahi.	<b>02</b>
<b>Total practical periods</b>	<b>16</b>



**B.Sc. V Semester**

**Course Code – ZOO - 804**

**PAPER: XVIII – H**

**POULTRY SCIENCE- I (PRACTICAL)  
(Elective Paper)**

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1. To study American Class poultry breeds	01
2. To study Asiatic Class poultry breeds	01
3. To study English Class poultry breeds.	01
4. To study Mediterranean Class poultry breeds.	01
5. To Study the Circulatory system of Poultry.	02
6. To Study the Respiratory system of Poultry.	02
7. To Study the Digestive system of Poultry.	02
8. To Study the Reproductive (Male and Female) system of Poultry	02
9. To Study Formation of egg.	02
10. To Study Structure of egg.	01
<b>Total practical periods</b>	<b>15</b>

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

**Time: 02:00 hours**

**Max. Marks: 100**

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

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



**Pattern of Question Paper**  
**B.Sc. V Semester**  
**Course Code - ZOL- 502**  
**PAPER: XVI - A**  
**FISHERY SCIENCE – I (Elective Paper)**

**Time: 02:00 hours**

**Max. Marks: 50**

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

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

**Pattern of Question Paper**  
**B.Sc. V Semester**  
**Course Code - ZOI - 502**  
**PAPER: XVI - B**  
**ANIMAL CULTURE - I (Elective Paper)**

**Time: 02:00 hours**

**Max. Marks: 80**

**N.B.** 1) Attempt all questions.

2) All question carry equal marks.

3) Illustrate your answer with suitable labeled diagram.

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



**Pattern of Question Paper**  
**B.Sc. V Semester**  
**Course Code - ZOL- 502**  
**PAPER: XVI - C**  
**ENTOMOLOGY - 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.<br>OR<br>Short Notes on:<br>a)<br>b)   | Based on chapter 1 to 3<br>OR<br>Based on chapter 1 to 3 |
| Q2. Long answer question<br>OR<br>Short Notes on:<br>a)<br>b)  | Based on chapter 4 & 5<br>OR<br>Based on chapter 4 & 5   |
| Q3. Long answer question.<br>OR<br>Short Notes on:<br>a)<br>b)   | Based on chapter 6 & 7<br>OR<br>Based on chapter 6 & 7   |
| Q4. Long answer question.<br>OR<br>Short Notes on:<br>a)<br>b)   | Based on all chapters<br>OR<br>Based on all chapters     |
| Q5. Short Questions: (Answer in One Sentence)<br>1)<br>2)<br>3)<br>4)<br>5)<br>6)<br>7)<br>8)<br>9)<br>10) | Based on all chapters                                    |



**Pattern of Question Paper**  
**B.Sc. V Semester**  
**Course Code - ZOL- 502**  
**PAPER: XVI - D**

**PARASITIC PROTOZOA AND HELMINTHS - I (Elective Paper)**

Time: 02:00 hours

Max. Marks: 60

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

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



**Pattern of Question Paper**  
**B.Sc. V Semester**  
**Course Code - ZOL- 602**  
**PAPER: XVI - E**

**COMPUTER APPLICATION & LAB. TECHNOLOGY- I (Elective Paper)**

**Time: 02:00 hours**

**Max. Marks: 60**

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

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

**Pattern of Question Paper**  
**B.Sc. V Semester**  
**Course Code - ZOL- 802**  
**PAPER: XVI – F**  
**BIOTECHNOLOGY – I (Elective Paper)**

Time: 02:00 hours

Max. Marks: 50

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

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

**Pattern of Question Paper**  
**B.Sc. V Semester**  
**Course Code - ZOL- 602**  
**PAPER: XVI - G**  
**DAIRY TECHNOLOGY- I (Elective Paper)**

**Time: 02:00 hours**

**Max. Marks: 50**

**N.B. 1) Attempt all questions.**

**2) All questions carry equal marks**

**3) Illustrate your answer with suitable labeled diagram.**

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

**Pattern of Question Paper**  
**B.Sc. V Semester**  
**Course Code - ZOL- 502**  
**PAPER: XVI - H**  
**POULTRY SCIENCE - I (Elective Paper)**

**Time: 02:00 hours**

**Max. Marks: 50**

**N.B. 1) Attempt all questions.**

**2) All questions carry equal marks.**

**3) Illustrate your answer with suitable labeled diagram.**

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





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

1. Concept of organic evolution :-	<b>06</b>
➤ Definition and concept.	
➤ Theories of organic evolution in brief; Empiricist theory, Bear's Law, Biogenetic law, catastrophism, Lamarckism, Darwinism and Germplasm theory	
2. Origin of Life .	<b>03</b>
➤ Definition, Autogenesis, Biogenesis.	
➤ Chemical evolution of life.	
3. Evidences of Organic Evolution :-	<b>04</b>
➤ Anatomical evidences.	
➤ Embryological evidences.	
4. Darwinism :-	<b>06</b>
➤ Introduction :- Natural selection theory,	
➤ Artificial selection theory and sexual selection theory	
5. Elemental forces of evolution .	<b>07</b>
➤ 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 :-	<b>09</b>
➤ Sequential and divergent evolution.	
➤ Microevolution: - Concept, salient features and mechanism with example	
➤ Macro evolution: - Concept, salient features and mechanism with example.	
➤ Mega evolution - Concept, salient features and mechanism with example.	
7. Species and speciation:	<b>07</b>
➤ Species: - Morphological concept, Genetical concept, biological concept of species	
➤ Speciation: - Definition, concept, mechanism of speciation	
➤ Allopatric, Sympatric and Parapatric speciation	
8. Fossils :-	<b>04</b>
➤ Definition, fossil formation	
➤ Types of fossils.	
<b>Total Periods</b>	<b>46</b>



**B.Sc. VI Semester**  
**Course Code - ZOL-602**  
**PAPER: XX - A**  
**FISHARY SCIENCE - II**  
**(Elective Paper)**

**FISH CULTURE AND FISH TECHNOLOGY**

<b>A. fish culture</b>		
1.	Introduction a) Types of freshwater ponds-perennial and seasonal. b) Different types of ponds nursery, rearing and stocking ponds. c) Design, construction and maintenance of nursery, rearing and stocking ponds d) Productivity of ponds e) principles of fish collection f) Fish culture methods: g) Culture – cat fish, rohu h) Sewage fish fisheries	<b>10</b>
2.	Fish crop production (fish diseases) Protozoan, fungal, bacterial, viral worms diseases	<b>05</b>
3.	Breeding of fishes a) Natural spawning of carps b) Artificial breeding by hypophysation c) Common carp breeding	<b>08</b>
<b>B. fish technology</b>		
4.	Fish preservation and processing a) Fish processing methods b) Fish spoilage c) Value added products d) Sanitation and HACCP	<b>08</b>
5.	Crafts and gears a) Different types of gears b) Different types of crafts c) Preservation of gears	<b>08</b>
<b>Total Periods</b>		<b>45</b>

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

**SERICULTURE**

1. History and general account of sericulture industry	02
Status, scope and problems of sericulture industry in India and Maharashtra.	02
1. Different types of silkworms, their systematic position and distribution.	08
2. life cycle of mulberry silk worm	
3. Morphology of different stages of B. mori. - Egg and types, larva - pupa, adult.	08
4. structure and working of silk gland	02
5. Food plants.	10
Brief account of food plants required for non-mulberry silk worms.	
Systematic position and morphology of mulberry plant.	
Selection of variety, preparation of planting material	
Agro-climatic condition required for plantation	
Methods of plantation (mulberry cultivation)	
Maintenance of mulberry garden (irrigation and fertilis)	
Common diseases and pest of mulberry and their control.	
Harvesting and preservation of leaves	
6. Silk worm rearing	10
Rearing house, model rearing house and others.	
Rearing equipments and their uses.	
Disinfection of rearing houses and equipments.	
Egg incubation, buck hatching and its incubation	
Hatching and brushing of larvae - methods of brushing	
Feeding and its schedule	
Bed cleaning, methods of bed cleaning	
Role of environmental conditions in rearing	
Moultng, care taken during moultng	
Spacing and its schedule	
Moultng spinning, harvesting of cocoon	
Transportation and marketing of cocoon.	
7. Important diseases, pest of silk worm and their control-	04
Bacterial, fungal, viral, protozoan	
Pest predators- beetle, mites, ants, lizards, birds, rats etc	02
10. Introduction to post harvesting technology (reeling)	08
Cocoon stifing, methods of stifing. Preservation and storage of cocoon.	
Cocoon cooking - methods of cocoon cooking	
Reeling- country charkha, flature.	
11. Sericulture as agro cottage employment generating village industry	01
12. Economics of sericulture.	01
<b>Total Periods</b>	<b>45</b>

**B.Sc. VI Semester**  
**Course Code - ZOL- 602**  
**PAPER: XX - C**  
**ENTOMOLOGY – 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. Jewel – Stem borer, Midge flies Cotton- Red cotton bug, pink bollworm Groundnut-White grub, and sucking bug Sugarcane- Pwilla, 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	Insecticide and plant protection appliances like Hand compression spray, Hand rotating duster, bucket pump	08
	<b>Total Periods</b>	<b>45</b>



B.Sc. VI Semester  
Course Code - ZOL- 602  
**PAPER: XX - D**  
**PARASITIC PROTOZOA AND HELMINTHES – II**  
(Elective Paper)

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**B- PARASITIC HELMINTHES**

1. General characters and classification of helminthes	02
2. Structure ,life history, pathogenesis and control measure of the following:	
➤ <i>Schistosoma haematobium</i>	03
➤ <i>Amphistex</i>	02
➤ <i>Taenia Saginata</i>	02
➤ <i>Echinococcus granulosus</i>	02
➤ <i>Trichostrongylus axei</i>	03
➤ <i>Enterobius vermicularis</i>	03
➤ <i>Ancylostoma duodenale</i>	02
➤ <i>Wuchereria bancrofti</i>	03
➤ <i>Onchocerca volvulus</i>	01
3. Gross morphology of Trematoda Cestoda and Nematode.	06
4. Reproductive organs of Trematodes Cestodes and Nematodes.	06
5. Body wall of Trematodes Cestodes and Nematodes.	06
Total periods: -	48



**B.Sc. VI Semester**  
**Course Code – Z01 - M2**  
**PAPER: XX - E**  
**COMPUTER APPLICATION AND MEDICAL LABORATORY TECHNOLOGY - II**  
**(ELECTIVE PAPER)**

<b>B-MEDICAL LABORATORY TECHNOLOGY</b>	
<b>1. Basic laboratory principles and procedure.</b>	<b>08</b>
Introduction	
Laboratory management system.	
Responsibility of laboratory worker	
Laboratory safety and aids and Training of technician.	
<b>2. Basic requirement of Laboratory.</b>	<b>12</b>
Glassware, solution and reagent equipment and instruments.	
(Autoclave, Hot air oven, Incubator, Water bath, Centrifuge, Colorimeter, PH meter, Haemoglobinometer, Micrometer, Glucometer.)	
<b>3. Routine examination of body fluids.</b>	<b>10</b>
Collection and examination procedure (method with special reference to clinical significance).	
Blood: HB count, Hb, WBC, RBC count, Haematocrit (mechanism of blood coagulation)	
Urine: Physical examination (Color and Odour) Chemical examination (Protein, Glucose, Bilirubin, Urobilinogens, Bilud, Ketone bodies, Acetone bodies)	
Sputum- Microscopic examination.	
Seminal- Microscopic examination, Sperm count, Sperm motility, Sperm morphology, Examination for the presence of semen.	
<b>4. Basic histopathological techniques</b>	<b>10</b>
Collection, fixation, preparation of tissue for section	
Staining and observations with critical comments.	
<b>5. Scope and importance of laboratory technique in clinical field of medical science.</b>	<b>05</b>
<b>Total Periods: -</b>	
<b>45</b>	



### **B.Sc. VI Semester Course**

**Code - ZOL - 602**

**PAPER: XX - F**

**BIOTECHNOLOGY - II**

**(Elective paper)**

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<b>1. Animal cell culture</b>	<b>08</b>
Basis requirements, Culture media & sterilization Contamination and sterilization of laboratory. Application and limitations of cell culture	
<b>2. Manipulation of reproduction and transgenic animals</b>	<b>05</b>
In vitro fertilization, nuclear transplantation (Dolly sheep) Transgenic animals- methods (Retroviral vector method, microinjection and ES cell methods)	
<b>3. Protein engineering</b>	<b>05</b>
Site directed mutagenesis (Directed mutagenesis oligonucleotide directed) Applications of mutagenesis, Hybridoma technology Commercial production of enzymes	
<b>4. Gene therapy and DNA fingerprinting</b>	<b>06</b>
Introduction, ex vivo, in vivo gene therapy Antigene & antisense gene therapy DNA fingerprinting	
<b>5. Human disease-diagnosis using biotechnology</b>	<b>02</b>
<b>6. Applications of biotechnology</b>	<b>08</b>
Agriculture Medicine Industry	

**Total Periods: - 45**

**B.Sc. VI Semester**  
**Course Code - ZOL- 602**  
**PAPER: XX - G**  
**DAIRY TECHNOLOGY - II**  
**(Elective paper)**

1. Concentrated indigenous dairy products :-	08
➤ Definition, Composition, Methods of production and yield of Peda, Dahi, Rasbi, Besanadi and Gulabjamun.	
2. Fermented Indigenous dairy product:	05
➤ Definition, Composition, Methods of production and yield of Chaska, Shrikhand and Shrikhand wadi.	
3. Frozen indigenous dairy product :-	06
➤ Definition, Composition, Methods of production and yield of Kufi, Mairi ka Rarf.	
4. Fat rich indigenous dairy product :-	06
➤ Definition, Composition, Methods of production and yield of Butter and Ghoo.	
5. Special milk :-	10
➤ Definition, Composition and Methods of production of Milk Shake, Flavored milk, Toned milk, Fortified milk, Recombined milk and Soya milk.	
6. Study of microbial toxins in dairy products	05
7. Role of dairy industry as an entrepreneur for development of small scale industry.	05

**Total Periods** **45**





**B.Sc. VI Semester**  
**Course Code - ZOL-802**  
**PAPER: XX - H**  
**POULTRY SCIENCE - II**  
**(Elective Paper)**

1. Poultry Management ;	<b>10</b>
> Brooder management:- Housing, sanitation & hygiene, litter, Temperature, space	
> Grower management	
> Layer management.	
> Raising of Broilers	
2. Housing for poultry,	<b>14</b>
> selection site for poultry farm	
> Free range or extensive system.	
> Semi intensive system	
> Intensive system.	
> Fostling System	
3. Feeding of poultry	<b>25</b>
> Requirement of poultry feed, feed ingredients,	
> Conventional and nonconventional poultry feed	
4. Processing of poultry products. Preservation of poultry products.	<b>05</b>
5. Marketing of poultry products.	<b>03</b>
6. Poultry diseases.	<b>08</b>
> Parasitic Protozoan	
> Bacterial, Fungal.	
<b>Total Periods</b>	<b>45</b>



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

---

1. Embryological evidences of evolution with the help of skeletal/pictures.	02
2. Adaptive modification in form of birds and mouth parts of insects	02
3. Study of successive stages of evolution with the help of models/charts * Horse * Human	02
4. Discussion on patterns of speciation with the help of charts (pictures). * Allopatric speciation * Sympatric speciation.	02
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- 601**  
**PAPER: XXII – A**  
**FISHARY SCIENCE – II (PRACTICAL)**  
**(Elective Paper)**

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1	Primary productivity of ponds (plankton studies).	02
2	Identification, classification and culturable significance of following. Ocella, rohu, mrigal, catfishes, exotic caraj	03
3	Collection and identification of fish parasites and worms	04
4	Removal of fish pituitary gland and preparation of pituitary extract	02
5	Identification of crafts and gears. Gill net, Rampanni, Salpatti, Madhwa, Catamaran.	02
6.	A visit to fish farm and fish processing centre is compulsory	02
<b>Total Practical Periods</b>		<b>15</b>

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

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1.	Different stages of silk worm from egg to adult. (salges (egg, sheet diff. stages of the larvae, pupa and adult.)	03
2.	Dissection of the silkworm to study the internal anatomy and mounting the silk glands mounting of mouth parts spinner etc spiracle etc.	02
3.	Study of disease causing pests of larvae, pupa and adult.	03
4.	Equipment needed in silkworm rearing centre.	02
5.	Mulberry leaves and utilization and study of mulberry varieties.	02
6.	Preparation of model of life cycle of <i>Bombix mori</i> and submission at the time of Examination	03
	<b>Total Practical Periods</b>	<b>15</b>

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

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1.	Collection, preservation and identification of Major crop pests (any five)  Jawar- Stem borer, Midges flies.  Cotton- Red cotton bug, pink bollworm  Groundnut-White grub, pod sucking bug  Sugarcane- Phylla	05
2.	Identification of common stored grain pests.  A- Rice Weevil B- Rice hettle C Grain moth	02
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
<b>Total Practical Periods</b>		<b>15</b>



**B.Sc. VI Semester Course**  
**Code – ZOL - 604**  
**PAPER: – XXII - D**  
**PARASITIC PROTOZOA AND HELMINTHES – II (PRACTICAL)**  
**(Elective Paper)**

**B-PARASITIC HELMINTHES**

- |   |    |
|---|----|
| 1. Study of microscopic structure of the following:   | 03 |
| ✓ Schistosome Species   |    |
| ✓ Fasciola hepatica   |    |
| ✓ Recal larva   |    |
| ✓ Cercaria larva  |    |
| ✓ V.S. Body wall of Fasciola.   |    |
| ✓ Metacercaria  |    |
| ✓ Copeid  |    |
| ✓ Trematode   |    |
| ✓ Paratyphlosteron  |    |
| ✓ Yersinia Saguatta   |    |
| ✓ Echinostoma granulosus  |    |
| ✓ Scolex of Taenia solium and Taenia saginata.  |    |
| ✓ Mature proglottids  |    |
| ✓ Gravid proglottids  |    |
| ✓ Hexacanth Larva   |    |
| ✓ Body wall of tapeworm   |    |
| ✓ <i>Cotylexum muriei</i>   |    |
| ✓ <i>Ascaris uncinoides</i> (specimen)  |    |
| ✓ T.S. of Body wall of <i>Ascaris</i>   |    |
| ✓ T.S. of <i>Ascaris</i> Male and Female  |    |
| ✓ <i>Ancylostoma</i> W.M.   |    |
| ✓ <i>Monofilaria</i> W.M.   |    |
| ✓ <i>Uchimaia</i> sparis  |    |
| 2. Collection, preservation, staining and identification of the Trematode parasite from the section of fig. | 04 |
| 3. Collection, preservation, staining and identification of the Cestode parasite from the chick intestine   | 04 |
| 4. Collection, preservation, mounting and identification of the Nematode parasite from the vertebrate       | 04 |

**Total Practical period: - 15**



**B.Sc. VI Semester Course**  
**Code - ZOL- 604**  
**PAPER: XXII - E**  
**COMPUTER APPLICATION AND MEDICAL LABORATORY TECHNOLOGY - II**  
**(PRACTICAL)**  
**(Elective Paper)**

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**MEDICAL LABORATORY TECHNOLOGY**

- |   |           |
|---|-----------|
| <b>1. Study of laboratory equipments.</b>   | <b>02</b> |
| Autoclave, hot air oven, incubator water bath,<br>Centrifuge, refrigerator, colorimeter, pH meter,<br>Haemoglobinometer, microtome, and Glucometer. |           |
| <b>2. Preparation of various reagents and fixatives.</b>  | <b>02</b> |
| <b>3. Histological techniques: preparation of biological material,<br/>Fixing, embedding sectioning, staining, and mounting.</b>                    | <b>02</b> |
| <b>4. Study of blood pressure apparatus, sphygmoscope.</b>  | <b>03</b> |
| <b>5. Blood analysis- Hb percentage<br/>. Counting of WBC and RBC, Hemostasis</b>   | <b>03</b> |
| <b>6. Urine analysis: Protein, Glucose, Bilirubin, Bileum,<br/>Ketone bodies, Acetone bodies,<br/>Or any other normal and abnormal constituent.</b> | <b>03</b> |

**Total Practical periods: - 15**



**B.Sc. VI Semester Course**  
**Code - ZOL- 604**  
**PAPER: XXII - F**  
**BIOTECHNOLOGY- II [PRACTICAL]**  
**(Elective Paper)**

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A- Sterilization of glassware and chemicals in tissue culture	03	
B- Preparation of culture media and sterilization	02	
C- Assay of cell viability using dye.	02	
D- Effect of pH on acid phosphatase activity	02	
E- Study of chromosomal aberration	01	
F- Pure Culture of microorganism/bacteria.	02	
G- Study of antibiotic resistant susceptibility of bacterial culture.	01	
H- Demonstration of Advanced methods of following Nuclear transplantation Hybridoma technique DNA fingerprinting St. culture	02	
<b>Total Practical Periods</b>		<b>15</b>



**B.Sc. VI Semester Course**  
**Code - ZDL- 604**  
**PAPER: XXXI - G**  
**DAIRY TECHNOLOGY- II (PRACTICAL)**  
**(Elective Paper)**

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1. Preparation of Peda.	01
2. Preparation of Burfi	01
3. Preparation of Rabdi.	01
4. Preparation of Basmundi.	01
5. Preparation of Gulab Jammun.	01
6. Preparation of Ghaktes.	01
7. Preparation of Shrikhand.	02
8. Preparation of Shrikhandwadi.	01
9. Preparation of Kullfi.	01
10. Preparation of Butter (Makhan).	01
11. Preparation of Ghee.	01
12. Preparation of Milk Shake.	01
13. Flavored milk	01
14. Soya Milk.	01

**Total Practical Periods 15**

**B.Sc. VI Semester**  
**Course Code - ZOL- 604**  
**PAPER: XXII - H**  
**POULTRY SCIENCE – II (PRACTICAL)**  
**(Elective Paper)**

---

1. To study Poultry housing system.	03
2. To identify and study feed ingredients	02
3. In preservation of eggs.	02
4. To study Protozoan diseases.	01
5. To study parasitic diseases.	01
6. To study Bacterial diseases.	01
7. To study fungal diseases.	01
8. to compute ration for chicken	01
9. to identify equipments in poultry farm	01
10. Visit to poultry farm	01

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



**Pattern of Question Paper**  
**B.Sc. VI Semester**  
**Course Code - ZOL-602**  
**PAPER: XX - A**  
**FISHARY SCIENCE - II (Elective Paper)**

Time: 02:00 hours

Max. Marks: 60

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

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

**Pattern of Question Paper**  
**B.Sc. VI Semester**  
**Course Code - ZOL- 602**  
**PAPER: XX - B**  
**ANIMAL CULTURE -- II (Elective Paper)**

Time: 02:00 hours

Max. Marks: 60

**N.B.** 1) Attempt all questions.

2) All questions 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 7

OR

Based on chapter 1 to 7

Q2. Long answer question.

OR

Short Notes on:

a)

b)

Based on chapter 8 to 10

OR

Based on chapter 6 to 10

Q3. Long answer question.

OR

Short Notes on:

a)

b)

Based on chapter 11 to 13

OR

Based on chapter 11 to 13

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



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

**Time: 02:00 hours**

**Max. Marks: 60**

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

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

**Pattern of Question Paper**

**B.Sc. VI Semester**

**Course Code - ZO - 602**

**PAPER: XX - D**

**PARASITIC PROTOZOA & HELMINTHS II (Elective Paper)**

**Time: 02:00 hours**

**Max. Marks: 60**

**N.B. 1) Attempt all questions.**

**2) All questions carry equal marks.**

**3) Illustrate your answer with suitable labeled diagram.**

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

**Pattern of Question Paper**  
**B.Sc. VI Semester**  
**Course Code - ZOL- 502**  
**PAPER: XX - E**

**COMPUTER APPLICATION & LABORATORY TECHNOLOGY – 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<br>OR<br>Short Notes on:<br>a)<br>b)   | Based on chapter 1 & 2<br>OR<br>Based on chapter 1 & 3 |
| Q2. Long answer question.<br>OR<br>Short Notes on:<br>a)<br>b)  | Based on chapter 2<br>OR<br>Based on chapter 2         |
| Q3. Long answer question.<br>OR<br>Short Notes on:<br>a)<br>b)  | Based on chapter 4 & 5<br>OR<br>Based on chapter 4 & 5 |
| Q4. Long answer question<br>OR<br>Short Notes on:<br>a)<br>b)   | Based on all chapters<br>OR<br>Based on all chapters   |
| Q5. Short Question (Answer in One Sentence):<br>1)<br>2)<br>3)<br>4)<br>5)<br>6)<br>7)<br>8)<br>9)<br>10) | Based on all chapters                                  |



**Pattern of Question Paper**  
**B.Sc. VI Semester**  
**Course Code - ZOL- 602**  
**PAPER: XX - F**  
**BIOTECHNOLOGY - II (Elective Paper)**

**Time: 02:00 hours**

**Max. Marks: 60**

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

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

**Pattern of Question Paper**  
**B.Sc. VI Semester**  
**Course Code - ZOL- 802**  
**PAPER: XX – G**  
**DAIRY SCIENCE - II (Elective Paper)**

**Time: 02:00 hours**

**Max. Marks: 50**

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

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



**Pattern of Question Paper**  
**B.Sc. VI Semester**  
**Course Code - ZOL - 802**  
**PAPER: XX - H**  
**POULTRY SCIENCE-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<br>OR<br>Short Notes on:<br>a)<br>b)  | Based on chapter 1<br>OR<br>Based on chapter 1               |
| Q2. Long answer question.<br>OR<br>Short Notes on:<br>a)<br>b)   | Based on chapter 2 & 5<br>OR<br>Based on chapter 2 & 5       |
| Q3. Long answer question.<br>OR<br>Short Notes on:<br>a)<br>b)   | Based on chapter 3, 4 & 6<br>OR<br>Based on chapter 3, 4 & 6 |
| Q4. Long answer question<br>OR<br>Short Notes on:<br>a)<br>b)  | Based on all chapters<br>OR<br>Based on all chapters         |
| Q5. Short Question (Answer in One Sentence)<br>1)<br>2)<br>3)<br>4)<br>5)<br>6)<br>7)<br>8)<br>9)<br>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 of .....of water sample (DO/ CO <sub>2</sub> /Acidity/Chlorinity) OR Estimation of primary productivity of pond water OR Estimation of .....of 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 association)- 02)	25
Q.5	Submission of permanent slides (At least five)	10
Q.6	Report book	10
Q.7	Viva-voce	05



**Skeleton of question paper**  
**B.Sc. V+VI Semester**  
**Course Code - ZOL-504+604**  
**PAPER: XXII - A + XXII - A**  
**FISHERY SCIENCES-I & II (PRACTICAL)**  
**(Elective Paper)**

Time: - 4:00 hrs

Total marks: -100

- |     |   |    |
|-----|---|----|
| Q.1 | Estimation of ..... from given water sample.<br>(pH, Alkalinity, or conductivity, Hardness, etc.)                       | 15 |
| Q.2 | Identify any four primary producers from given sample<br>OR<br>Description of ..... fish to explain its pituitary gland | 15 |
| Q.3 | Collection and identification of ..... parasite from fish.<br>OR<br>Identify and comment on crabs and gears.            | 15 |
| Q.4 | Identify and comment on given Spots.<br>(Major carp-03, brackish water-02 Marine water-03 cultureable -02)              | 30 |
| Q.5 | Submission of project report  | 10 |
| Q.6 | Record book   | 10 |
| Q.7 | Viva-voce   | 05 |



**Skeleton of question paper**  
**B.Sc. V+VI Semester**  
**Course Code - ZOL-50 4+ 804**  
**PAPER: XVIII - B + XXII - B**  
**ANIMAL CULTURE I&II (PRACTICAL)**  
**(Elective Paper)**

**Time: - 4:00 hrs**

**Total marks:-100**

---

Q.1	Identify the types of hives and equipments used in apiculture	15
	OR	
	Identify and comment on bee hive.	
Q.2	Dissection of silkworm so as to expose its silk gland	15
Q.3	Mounting of supplied material and write procedure followed.	10
Q.4	Identification of given casts of silkworm and write their consequences.	10
Q.5	Identify the given spots and comment on it (Equipments in apiculture-D2, silkworm stages-D1, types of bees -02)	25
Q.6	Submission of model	10
Q.7	Write book	10
Q.8	View vice	05



**Skeleton of question paper**  
**B.Sc. V+VI Semester**  
**Course Code - ZOL-504 + 004**  
**PAPER: XVIII – C + XXII – C**  
**ENTOMOLOGY – I & II (PRACTICAL)**  
**(Elective Paper)**

Time: - 4:00 hrs

Total marks:-100

---

Q.1	Dissertation on of-----system of grasshopper. Leave the well labeled Diagram of the same.	10
Q.2	study of major crop: pest	15
Q.3	Mounting / temporary preparation of pupated metella.	10
Q.4	Identify and describe (any five) (Stored grain pest-03, plant protection appliances-02)	15
Q.5	Identify and comment on given spods. (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	video-vice	05

Skeleton of question paper  
B.Sc. V+VI Semester  
Course Code - ZOL-804 + 804  
PAPER: XVIII – D + XXII – D  
**PARASITIC PROTOZOA & HELMINTHS .. I & II (PRACTICAL)**  
(Elective Paper)

Time: - 4:00 hrs

Total marks:-100

- 
- |     |   |    |
|-----|---|----|
| Q.1 | collect and identify .....protozoan from rectum of .....                      | 25 |
|     | OR  |    |
|     | Prepare the blood smear and identify parasitic protozoa from it.              |    |
| Q.2 | Dissect ..... and identify ..... helminths<br>(Frog rectum /chick intestine). | 20 |
|     | OR  |    |
|     | Dissect the given fish and identify the Helminths from it                     |    |
| Q.3 | Identify the given helminths larvae and comment on it.                        | 10 |
| Q.4 | Identify the given spores and comment on it                                   | 30 |
| Q.5 | read book   | 10 |
| Q.6 | viva voce   | 05 |



**Skeleton of question paper**  
**B.Sc. V+VI Semester**  
**Course Code - ZOL- 504 + 604**  
**PAPER: XVIII – E + XXII – E**  
**COMPUTER APPLICATION AND**  
**LABOLATORY TECHNIQUES –I & II (PRACTICAL)**  
**(Elective Paper)**

**Time: - 4:00 hrs**

**Total marks:-100**

- 
- |     |   |    |
|-----|---|----|
| Q.1 | Demonstrates any five DOS commands on computer and writes their syntax.<br>OR<br>Demonstrate and use of any two window commands   | 20 |
| Q.2 | Give WBC/ RBC count of given blood sample write the procedure<br>OR<br>Find out the constitute of given urine sample and write the procedure  | 20 |
| Q.3 | prepare the data sheet of given data on Faced blood<br>OR<br>Search ..... on internet and show to Examinar.<br>(Keyword related to zoology like ecosystem, urine formation, gene etc) | 10 |
| Q.4 | preparation of given solutions of xatve and write procedure followed for it.<br>OR<br>preparation of block of given tissue for in culture   | 10 |
| Q.5 | Identify the given Scote and comments on it<br>(Computer hard-were - 03/ lab. Instruments -2)   | 25 |
| Q.6 | Record book   | 10 |
| Q.7 | Vid-vice  | 05 |



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

**Time: - 4:00 hrs**

**Total marks:-100**

Q.1	Estimation of total DNA from ..... tissue of ..... OR Isolation of messenger RNA from, ..... tissue of ..... OR Isolation of total DNA from..... tissue of ..	<b>25</b>
Q.2	preparation of culture media for animal culture OR Sterilization of ..... for tissue culture and write procedure. (Chemical / glassware/ lab) OR Effect of pH on acid phosphatase activity and Record the observation	<b>25</b>
Q.3	writes principle and application of..... OR Assay of cell viability using, ..... dye. OR Observation of antibiotic resistance of ..... antibiotic in bacterial strain.	<b>20</b>
Q.4	study of chromosomal aberration	<b>15</b>
Q.5	Report book	<b>10</b>
Q.6	Video-cass	<b>05</b>

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

**Time: - 400 hrs**

**Total marks-100**

---

Q.1	Assure the quality of given milk sample using.....method (At least two methods)	25
OR		
	Determine the amount of fat in given milk sample.	
Q.2	Prepare .....from milk	20
Q.3	Determine the .....of milk (any one) (Acidity, TS, SNF, NFR, SPC)	10
OR		
	Prepare ..... from milk.	
Q.4	Identify and comment on following spots: (Milk products)	30
Q.5	Record book	10
Q.7	ywc-vice.	05



**Skeleton of question paper**  
**B.Sc. V+VI Semester**  
**Course Code - ZOL-504 + 604**  
**PAPER: XVIII - H + XXII - H**  
**POULTRY SCIENCES - I & II (PRACTICAL)**

Time: - 4:00 hrs

Total marks-100

- |     |  |    |
|-----|--|----|
| Q.1 | Identify and comment of given poultry breeds   | 20 |
|     | OR   |    |
|     | Identify and comment on ..... system of poultry.   |    |
|     | Draw the well labeled diagram of .....   |    |
| Q.2 | Identify and comment on equipments in poultry farm   | 20 |
| Q.3 | Identify the stages of egg formation and comment on it.  | 15 |
|     | OR   |    |
|     | Explain the poultry house system.  |    |
| Q.4 | Identify the given soils and comment on it<br>(Food ingredients) (5/5) (disease causing agents-05) | 10 |
| Q.5 | Record book  | 10 |
| Q.6 | vivo-vice  | 05 |



### RECOMMENDED BOOKS

#### ECOLOGY

- Chapman – Ecology- Cambridge low size Edition.
- Verma and Agarwal- Principles of ecology
- Kenneddy, C.J. Concepts of ecology. Prentice Hall, New Delhi.
- Clarke, G. I. 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. Columbia University Press
- Dobzhansky, Th., F.J. Ayala, G.L. Stebbins and J.M. Valentine.
- Evolution, Subject Publication, Delhi.
- Futuyama, D.J. Evolutionary Biology. Sinauer Associates: ING 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.
- Mendel, D. J. Evolution and genetics. Oxford University Press. New York
- Strickberger, M.W. Evolution. Jones and Bartlett Publishers. Boston, London.
- Moody. An introduction to evolution
- Full organic evolution
- P.K.Gupta- Ecology, genetics and Evolution
- Savage- Evolution
- Tomer and Singh – organic evolution, Hastogi Publication, Meerut

#### FISHERY SCIENCES-LAND II

- Fish and fisheries of India – V.G Jhingran. Hindustan pub. Co,India.
- Tropical fish farming- D.K.Belare, Environmental publication, karad.
- Aquaculture – J.E. Bardach, J.H. Ryther, W.O. McLamoy, 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. Farnham, Surrey, England



- Fish Farming Hand Book - E.C. Brown and J. P. Gratzzak, 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.
- Encyclopaedia of Fishes and Fisheries in India -A. K. Pantley, C.S. Banau, Vol.IV Animal 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 physical/chemical analysis of water- Gottemmel et al.
- Induced breeding of carps - H. Choudhary and S.B. Singh.
- An introduction to fishes- S.B. Khanna, central book dept. Alahabad
- Manual of Methods in Fish Biology- S.P. Daswari, South Asian Publ. new, Delhi.
- Diseases of fish- Van Duffen Jr. Jibe book London.

#### ANIMAL CULTURE [APICULTURE]

- Beekeeping in India – Khadi and village Industries board gov. of maharashtra
- Techniques of bee keeping- OBR and training institute, pune
- Invertebrate zoology - kripa
- Anatomy of honeybees- sydneya, R.E.

#### ANIMAL CULTURE [SERICULTURE]

- Hand book of practical sericulture-Mershilhanu and Utal
- Agro-collage industry – sericulture – G.J.Hiware
- Tropical sericulture – laxina
- Sericulture manuals - 1<sup>st</sup> to 4<sup>th</sup> FAO publication.
- Bulletin of CSR and IT, Mysore



**BIOTECHNOLOGY I&II**

- Primrose, S. B and Twyman, R. M., -Principles of Gene Manipulation and Genomics. (7th Ed. 2008) Blackwell Publishing, West Sussex, UK
- Bernard R. and Jack- Molecular Biotechnology: Principles and application of recombinant DNA, ASM Press, Harnden, USA
- R.C.Dubey & Maheshwari - Biotechnology S.Chand Publication
- B.D.Singh- Biotechnology-Himalaya publication
- Verma &Agarwal -Genetic engineering-S.Chand Publication
- Click Molecular Biotechnology
- Mayer H.A.-Molecular biology and Biotechnology
- satyanarayana-biotechnology-

**DAIRY TECHNOLOGY I&II**

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

*Handwritten signature and text:*  
Dr. S. K. Das  
Principal  
Bachchan

S-30th May, 2015 AC after Circulars from Circular No.] &amp; 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.**

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२५-बॉटनी, २०: ३ अ. के लिए (अनुसंधान) सम-संस्कार सं. ३ & अग्र-संस्कार - ५ -

२५ - २ -

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, [B. Sc. Unit], in-charge 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.

—/—/—

२५/२०२०/२५-

**DR.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,  
AURANGABAD.**



**REVISED SYLLABUS**

**OF**

***B.Sc. Botany***

***THIRD YEAR***

**Fifth & Sixth Semester**  
**[Effective from - June, 2015-16 & onwards]**

**DR.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,**  
**AURANGABAD**  
**Faculty of Science**  
**B.Sc. III YEAR SYLLABUS**  
**Subject- BOTANY**  
**Semester- V AND VI**

	Paper No.	Title of Paper	Lectures	Marks
		<b>SEMESTER – V</b>		
	XV	Cell Biology and Molecular Biology	45	50
<b>B.Sc.</b> <b>III</b>	XVI(A)	Diversity of Angiosperms - I	45	50
		OR		
	XVI (B)	Plant Breeding and Seed Technology		
		OR		
	XVI (C)	Plant Pathology	45	50
	OR			
	Biotechnology			

XVI(D)			
XVII	Practical based on Paper - XV	45	50
XVIII	Practical based on Paper - XVI	45	50
	<b>SEMESTER – VI</b>		
XIX	Genetics and Biotechnology	45	50
XX (A)	Diversity of Angiosperms - II		
	OR		
XX (B)	Economic Botany		
	OR		
XX (C)	Microbiology and Disease Management	45	50
XX (D)	OR		
	Bioinformatics		
XXI	Practical based on Paper - XIX	45	50
XXII	Practical based on Paper - XX	45	50

**B.Sc. III Botany (Theory)**  
**Semester -V**  
**Paper XV**  
**(Cell Biology & Molecular Biology)**

(45L)

**Unit-1**

1. Cell:

Structure of Prokaryotic cell (Bacterial cell) and Eukaryotic cell  
(plant cell)

(02)

2. Cell wall and cell organelles:

Structure and functions of cell wall and Cell organelles – Golgi complex,  
Endoplasmic reticulum, Lysosomes

(08)

3. Nucleus:

Ultra structure, (nuclear membrane, nucleolus, chromatin material,  
nucleoplasm ), Functions of nucleus.

(05)

**Unit-2**

1. Cell division:

(06)

a) Cell cycle -G1 phase, S phase, G2 phase and M phase

b) Mitosis – definition, process and significance.

c) Meiosis-definition, process and significance.

2. Nucleic acids:

(09)

a. DNA: Definition, structure, chemical composition (nitrogenous bases, purines,

- pyrimidines, nucleosides, nucleotides, phosphate and sugars) Watson and Crick's model, Z - DNA, B - DNA, functions of DNA
- b. Replications of DNA – conservative, semi conservative and dispersive.
  - c. RNA: Structure, types and functions

### Unit-3

#### 1) Chromosome:

(07)

Definition, morphology-size, shape, number, Ultra structure – chromatid, chromonema, chromomere, centromere, kinetochore, secondary constriction, satellite, telomere, heterochromatin, euchromatin, Nucleosome model (Woodlock 1973), chemical composition, Functions of chromosome, Giant chromosomes-polytene and lampbrush chromosome.

#### 2) Chromosomal aberrations :

(08)

- a) Structural-deletion, duplication, inversion and translocation
- b) Numerical: – euploidy and aneuploidy

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### B.Sc. III Year (Theory)

#### Semester – V

#### Paper XVI (A)

#### (Diversity of Angiosperms-I)

(45 L)

#### Unit: 1

##### 1. Biodiversity

(03)

Definition, concept, origin and evolution

##### 2. Types of biodiversity:

(05)

Species, genetic, ecological, cropland and agricultural diversity;  
biodiversity in India; endemism and hot spots; threatened species,  
threats to biodiversity

**3. Conservation of biodiversity: (07)**

Major causes for loss of biodiversity, listing of threatened biodiversity;  
threatened categories – extinct, endangered, vulnerable, rare and indeterminate.  
Conservation measures: – ex-situ, and in-situ; biodiversity conservation in India.

**Unit -2**

**Phytotaxonomy: (08)**

Classification of Angiosperms with special reference to Linnaeus,  
A. P. de Candolle, Bentham and Hooker.

**Study of diversity following families with reference to the system  
of classification of Bentham and Hooker**

(22)

- |                    |                  |
|--------------------|------------------|
| 1. Magnoliaceae    | 2. Nymphaeaceae  |
| 3. Papveraceae .   | 4. Brassicaceae  |
| 5. Capparidaceae . | 6. Rutaceae      |
| 7. Rhamnaceae      | 8. Combretaceae  |
| 9. Lythraceae      | 10.Cucurbitaceae |
| 11. Apiaceae       |                  |

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**B. Sc. III Year (Theory)**

**Semester -V**

**Paper: XVI (B)**

**(Plant Breeding and Seed Technology) (45L)**

**Unit -1**

**Plant Breeding :**

1. Introduction, history, aims and objectives (02)
2. Domestication, plant introduction and acclimatization (02)
3. Hybridization – history, hybridization procedure. (03)
4. Selection methods -mass selection, pureline selection and clonal selection (04)
5. Hybridization in self pollinating plants (03)
6. Hybridization in cross pollinating plants (03)
7. Heterosis and hybrid vigour (02)
8. Mutation in crop improvement (02)
9. Hybridization programme in Jowar and Cotton (06)
10. Experimental designs and biometrical techniques in plant breeding - Randomized block design, Latin square design, Analysis of variance, Assessment of variability, Simple measures of variability (03)

**Unit -2**

**Seed Technology :**

1. Seed technology -history, aims and objectives (01)
2. Morphology and anatomy of seed ( monocot and dicot seed , endospermic and non endospermic seed) (02)
3. Stages of seed multiplication -
  - a. nucleus seed (04)
  - b. breeders seed
  - c. foundation seed
  - d. certified seed



e. registered seed

f. truthful seed

4. Seed certification process (02)
5. Stagewise multiplication of foundation and certified seed in Jowar and Cotton (02)
6. Seed processing – drying, cleaning, dressing, bagging, tagging, storage and marketing (02)
7. New techniques in seed technology (02)

\*\*\*\*\*

**B.Sc. III Year (Theory)**

**Semester –V**

**Paper XVI (C)**

**(Plant Pathology)**

**(45L)**

**Unit-1**

**Fundamentals of plant pathology:**

1. Plant pathology – history, scope, losses due to pathogens, importance and need to study plant pathology (02)
2. Classification of plant diseases on the basis of symptoms and causal organisms – animate and inanimate (03)
3. Plant pathological institutes – IARI (Indian Agricultural Research Institute), ICRISAT(International Crop Research Institute for Semi Arid Tropics) (02)
4. Seed pathology – concept and importance of seed pathology, seed borne pathogens, methods to study seed borne pathogens (03)
5. Study of air borne pathogens: methods and applications (03)
6. Field and laboratory diagnosis of plant disease - Koch's postulates (02)

**Unit-2**

**Plant diseases:**

Study of the following diseases with respect to symptoms, causal organism, disease cycle and disease management:

- 1) **Cereals:**
  - a. Black stem rust of wheat (05)
  - b. Grain smut of jowar
  - c. Ergot of bajra
- 2) **Pulses:**
  - a. Wilt of pigeon pea (04)
  - b. Yellow vein mosaic of bean
- 3) **Vegetables:**
  - a. Late blight of potato (05)
  - b. Little leaf of brinjal
  - c. Black rot of onion (*Aspergillus*) (04)
- 4) **Oil seeds:**
  - a. Tikka disease of groundnut
  - b. Damping off of mustard
- 5) **Cash crops:**
  - a. Grassy shoot of sugarcane (06)
  - b. Downy mildew of grapes
  - c. Angular leaf spot of cotton
  - d. Citrus canker
- 6) **Ornamentals:**
  - a. Powdery mildew of rose (02)
- 7) **Weeds:**
  - a. Rust of Euphorbia (02)



**B. Sc. III Year (Theory)**

**Semester- V**

**Paper XVI (D)**

**(Biotechnology)**

**(45L)**

**Unit- 1**

**Biotechnology:**

1. **Introduction:**
  - a. Definition, scope and multidisciplinary nature (05)
  - b. Biotechnology in India
2. **DNA structure, replication and recombination:** (05)
  - a. Structure of DNA
  - b. Replication of DNA, Role of DNA polymerase
  - c. Denaturation and renaturation of DNA
  - d. Recombination
3. **Recombinant DNA technology:** (15)
  - a. Introduction, principles and procedure
  - b. Enzymes involved in recombinant DNA technology
  - c. Vectors
  - d. Southern and Northern blotting technique
  - e. Techniques in gene mapping
  - f. DNA fingerprinting
  - g. PCR
  - h. DNA sequencing
  - i. Genomics and DNA libraries
4. **Genetic engineering:** (05)
  - a. Introduction to transgenic plants
  - b. Vectors for gene deliveries
  - c. Marker and reporter genes
  - d. Role of agriculture in crop biotechnology
  - e. Achievements in plant biotechnology

**Unit- 2**

1. **Plant tissue culture:** (10)
  - a. Principles of tissue culture
  - b. Terminology in tissue culture
  - c. Cellular differentiation and totipotency
  - d. Organogenesis and embryogenesis
  - e. Protoplast isolation and culture
  - f. Meristem culture
  - g. Anther culture
  - h. Applications of tissue culture
2. **Research projects:** (05)

- a. Human genome project
- b. Plant genome project
- c. DBT, Ministry of Science and Technology.

### **B.Sc. III Botany (Practical)**

#### **Semester -V**

#### **Paper XVII**

#### **(Cell Biology & Molecular Biology)**

(45 L)

#### **Unit-1**

1. Study of the cell structure from onion leaf or *Tradescantia* leaf
2. Preparation of cytological (AA, FAA etc.) fixatives and stains  
(acetocarmine, aceto-orcein).
3. Study of electron micrographs of viruses, bacteria and cyanobacteria
4. Study of electron micrographs of eukaryotic cell and different cell organelles
5. Preparation of slides for the study of mitosis (root tips of onion)
6. Preparation of slides for the study of meiosis (*Rhoeo*, *Aloe* or onion flower buds)
7. Preparation of idiogram from the given micrograph of karyotype
8. Observation of giant chromosomes in *Chironomous* larvae
9. Preparation of wool models of mitosis, meiosis, cell structure, Chromosome, DNA and RNA.

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**B.Sc. III Year (Practical)**  
**Semester – V**  
**Paper XVIII (A)**  
**(Diversity of Angiosperms-I)**

**(45 L)**

**Unit: 1**

1. Study of herbarium
2. Study of analytical characters
3. Preparation of indented and bracketed keys
4. Study of following families:

1. Magnoliaceae
2. Nymphaeaceae
3. Papaveraceae
4. Brassicaceae
5. Capparidaceae
6. Rutaceae,
7. Rhamnaceae
8. Combretaceae
9. Lythraceae
10. Cucurbitaceae
11. Apiaceae,

5. Mounting of pollen grains (acetolysis method)

**Note:** Students should undertake excursion to ecologically different areas

for plant study and submission of list and photographs of wild plants at the

time

of practical examination.

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**B. Sc. III Year (Practical)**  
**Semester -V**  
**Paper: XVIII (B)**  
**(Plant Breeding and Seed Technology)**

(45 L)

**Unit -1**

Plant breeding:

1. Study of floral biology of jowar and cotton
2. Demonstration of male sterility in jowar
3. Artificial emasculation and pollination in jowar and cotton
4. Demonstration of hybridization techniques in jowar and cotton
5. Designing of field experiments
6. Visit to plant breeding centre

Seed technology:

1. Study of morphology and anatomy of monocot, dicot, endospermic and non endospermic seeds
2. Study of seed germination – observation of normal and abnormal seedlings, germination percentage
3. Blotter test
4. Method of breaking seed dormancy
5. Study of various seed processes – drying, cleaning, dressing, bagging, tapping and marketing
6. Preparation of seed certification tag
7. Viability test (Tetrazolium test)
8. Visit to various seed farms and research centres

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**B.Sc. III Year (Practical)**  
**Semester –V**  
**Paper XVIII (C)**  
**(Plant Pathology)**

**(45L)**

**Unit-1**

1. Study of Koch's postulates – isolation, inoculation and disease development
2. Study of the following diseases with respect to symptoms, causal organism, disease cycle and disease management
  - 1) **Cereals:**
    - a. Black stem rust of wheat
    - b. Grain smut of jowar
    - c. Ergot of bajra
  - 2) **Pulses:**
    - a. Wilt of pigeon pea
    - b. Yellow vein mosaic of bean
  - 3) **Vegetables:**
    - a. Late blight of potato
    - b. Little leaf of brinjal
    - c. Black rot of onion (*Aspergillus*)
  - 4) **Oil seeds:**
    - a. Tikka disease of groundnut
    - b. Damping off of mustard
  - 5) **Cash crops:**

- a. Grassy shoot of sugarcane
- b. Downy mildew of grapes
- c. Angular leaf spot of cotton
- d. Citrus canker

6) **Ornamentals:**

Powdery mildew of rose

7) **Weeds:**

Rust of Euphorbia

8) **Trees:**

*Cercospora* on *Albizzia* fruits

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**B. Sc. III Year (Practical)**

**Semester- V**

**Paper XVIII (D)**

**(Biotechnology)**

**(45L)**

**Unit- 1**

1. Principle and working of instruments in biotechnology laboratory - Autoclave / Pressure Cooker, Centrifuge, Hot plate, Water bath, Laminar Air flow, Oven, Microscope, pH Meter, Refrigerator, Magnetic Stirrer, Shaker, Agarose Gel Electrophoresis, Green House etc.
2. Sterilization of glasswares
3. Preparation of sterile media, nutrient broth, PDA, M.S. medium, B5 medium, White medium
4. Isolation of bacteria and fungi from air
5. Demonstration of meristem culture
6. Demonstration of anther culture
7. Separation of amino acids by gel electrophoresis

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**B. Sc. III (Theory)**  
**Semester -VI**  
**Paper XIX**  
**(Genetics and Biotechnology)**

**(45 L)**

**Unit : 1**

**1. Mendelism:**

**(04)**

- i. Introduction -G.J. Mendel
- ii. Mendelian principles –Law of Dominance , law of segregation, law of independent assortment, back cross and test cross

**2. Interaction of genes:** (07)

- i. Allelic interaction: incomplete dominance, co dominance, lethal genes and blood group inheritance
- ii. Non allelic and non epistatic -comb shapes in fowls
- iii. Non allelic and epistatic:
  - a) Complementary genes or duplicate recessive epistasis (9:7)
  - b) Supplementary genes or recessive epistasis (9:3:4)
  - c) Dominant epistatic genes or dominant epistasis (12:3:1)
  - d) Duplicate genes or duplicate dominant epistasis (15:1)

**3. Sex determination:** (04)

- i. Chromosomal theory of sex determination
- ii. Mechanism of sex determination in man (xx -xy), Drosophila (xx and xy), birds (zz-zw), grasshopper (xx-xo) and genic balance theory in Drosophila
- iii. Sex determination in plants – *Melandrium*

**Unit : 2**

**1. Sex linked inheritance:** (07)

X, XY and Y linked inheritance:

- i) Colourblindness and hemophilia in man
- ii) Holandric genes
- iii) White eye colour in Drosophila
- iv) Gynandromorphs

**2. Structure and function of gene:** (08)

- i. Fine structure of gene (Seymour Benzer)
- ii. One gene one enzyme hypothesis
- iii. Genes and related diseases – phenylketonuria, and alkaptonuria
- iv. Detection of genetic diseases –amniocentesis Genetic counseling

**Unit: 3**

**Biotechnology:**

(15)

1. Concept of genetic engineering and recombinant DNA technology
2. Restriction endonucleases, their properties and uses
3. Cloning vectors -plasmids and phage vectors
4. Techniques of genetic engineering -isolation of desired gene, gene cloning, transfer of gene into plants
5. Applications of genetic engineering

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**B.Sc. III Year (Theory)**  
**Semester – VI**  
**Paper XX (A)**  
**(Diversity of Angiosperms-II)**

**(45 L)**

**Unit: 1**

Plant identification: keys, herbaria and botanical gardens

(04)

Origin of angiosperms: origin and evolution, Bennettitalean,

Ranalian and Caytonial theory

(05)

Binomial nomenclature: Principles and rules

(03)

Modern trends in taxonomy:

(03)

Cytotaxonomy, chemotaxonomy, and numerical taxonomy

**Unit: 2**

**1. Phytotaxonomy:**

(10)

Study of Engler & Prantle, Hutchinson, Takhtajan system of classification

**2.Study of diversity of families:**

(20)

- a. Asclepiadaceae
- b. Scrophulariaceae
- c. Oleaceae
- d. Convolvulaceae
- e. Verbenaceae
- f. Amaranthaceae
- g. Euphorbiaceae
- h. Orchidaceae
- i. Liliaceae
- j Commelinaceae

\*\*\*\*

**B. Sc. III Year (Theory)**

**Semester- VI**

**Paper: XX (B)**

**(Economic Botany)**

**(45L)**

**Unit -1**

Origin, morphology, production, cultivation practices, harvesting and uses of crop plants.

- a) **Cereals:** Maize, Pearl millet and Rice
- b) **Pulses:** Bengal gram, Black gram and Pigeon pea
- c) **Oil seed crops:** Soybean, Mustard and Castor

**Unit -2.**

- a) **Fibre crops:** Jute, Sunhemp and Cotton
- b) **Horticultural crops:** Banana, Orange and Mango
- c) **Ornamentals:** Rose, Orchids and *Chrysanthemum*

**Unit -3.**

- a) **Beverages:** Tea and Coffee



- b) **Forage crops:** Cowpea, Jowar and Lucerne
- c) **Vegetable crops:** Brinjal, Potato, Tomato and Onion
- d) **Condiments and Spices:** Cardamom, Black pepper and Chillies

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**B.Sc. III Year (Theory)**  
**Semester –VI**  
**Paper XX (C)**  
**(Microbiology and Disease Management)**

**(45L)**

**Unit-1**

**1. Microbiology**

Microorganisms in biological world, their classification and features of different groups (03)

**2. Microbial techniques:**

- a. Microscopy – simple, compound and electron microscope
- b. Micrometry – Principle, working and uses
- c. Staining – common stains used in pathology, their preparation and significance, (cotton blue and Gram's Stain)
- d. Sterilization of glass wares and media (06)

**3. Culture media for isolating plant pathogen**

Industrial application of microorganisms - organic acids, alcohol, milk products, antibiotics and bio pesticides  
(06)

**Unit-2**

**Disease management:**

- 1. Preventive methods: field sanitation, use of clean planting material, crop rotation, trap crops, time of sowing, planting distance and tillage  
(02)

**2. Control methods –**

- a. Seed treatment: concept, objective, traditional and modern methods of seed treatment  
(02)
- b. Soil sterilization: concept, objectives and methods (02)
- c. Fungicides: Definition, classification and ideal characteristics of fungicides, study of fungicides with respect to active ingredients, formulations, methods of application, mode of action and uses (08)
  - i. Sulphur fungicides – Inorganic – Wettable sulphur, Organic – Thiram
  - ii. Copper fungicides
  - iii. Mercuric chloride – Agrosan – GN
  - iv. Heterocyclic nitrogenous compounds – Captan
  - v. Benzene compounds – Dexon

- vi. Antibiotics – Streptomycin and Aureofungin
  - vii. Systemic – Bavistin and Vitavax
  - d. Pesticides: Nicotin,Neem and pyrethrum (01)
  - e. Rhodenticides – Zinc phosphoid (01)
  - f. Nematicides- Nemagon, Propoxar (01)
  - g Weedicides- 2,4-D (01)
  - h. Biological control- definition, need, examples and role (02)
  - Plant quarantine (01)
3. Control measures and environment: pollution due to chemicals, residual effects, toxicity, safe measures, colour code, antidote, symptoms of poisoning, precautions in using pesticides (03)
4. Pesticide application equipments: principle and working –pneumatic air pump knapsack sprayer, mist blower and duster, types of nozzles (03)
5. Plant clinic: Concept, objective and need (01)
6. Recent techniques in plant pathology: Genetically modified organisms (GMO's), B. T. Cotton, Pheromones (02)

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**B. Sc. III Year (Theory)**  
**Semester- VI**  
**Paper XX (D)**  
**(Bioinformatics)**  
**(45L)**

**Unit- 1**

1. Introduction to bioinformatics and its applications (03)
2. Sampling, sample size, sampling techniques (03)
3. Data collection and presentation: (05)
  - a. Types of data
  - b. Methods of data collection
  - c. Data presentation - line chart, bar chart, histogram, polygon, ogive curve, pie diagram
4. **Measures of central tendency:** (04)
  - a. Mean
  - b. Median
  - c. Mode ,

**Unit – 2**

1. **Measures of variability:** (05)
  - a. Mean deviation,
  - b. Standard deviation
  - c. Coefficient of variation
  - d. Standard error
2. Probability, chi-square test, t – test (05)
3. Introduction to computer basics- general characters, types of computer (03)
4. Hardware-input and output devices, CPU, storage devices (02)

**Unit – 3**

1. Software – MSDOS, Windows, Linux, concept of files and folders and directories, (08)  
Application software - Word processor, Spread sheet, Presentation, MS-access, html document
2. Networking technology - LAN, WAN, Arpanet, Internet, Web browsing and servers – Netscape navigator, Internet explorer, search engines like yahoo,

google etc. Introduction to MEDLINE, CCOD and PUBMED for biological information, Introduction to bioinformatics software - bioperl biojava bioxml  
(07)

**B.Sc. III (Practical)**  
**Semester -VI**  
**Paper XXI**  
**(Genetics and Biotechnology)**

**(45 L)**

1. Quiz
2. Working out laws of inheritance by using seed mixtures
3. Problems based on gene interaction
4. Problems based on sex linked inheritance

**B.Sc. III Year (Practical)**  
**Semester – VI**  
**Paper XXII (A)**  
**(Diversity of Angiosperms-II)**

**(45 L)**

1 . Study of following families:

1. Oleaceae
  2. Asclepiadaceae
  3. Convolvulaceae
  4. Scrophulariaceae
  5. Verbenaceae
  6. Amaranthaceae
  7. Euphorbiaceae
  8. Orchidaceae
  9. Liliaceae
  10. Commelinaceae
2. Mounting of pollen grains (acetolysis method) and measurement of pollen size.
  3. Study of different types of stomata and epidermal structures  
(Trichome)
  4. Identification of plants up to species by using flora (Flora of Bombay  
Presidency/ Flora of Marathwada)
  5. Students should undertake excursion to ecologically different areas for plant

study and submission of list and photographs of wild plants at the time of examination.

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**B. Sc. III Year (Practical)**

**Semester- VI**

**Paper: XXII (B)**

**(Economic Botany)**

**(45L)**

**Economic Botany:**

1. Study of morphology, structure and simple histochemical tests of food storing tissues in Maize, Rice, Jowar, Gram, Pigeon pea, Potato
2. Study of histochemical tests of lignin and cellulose (Jute, Cotton, Sunhemp)
3. Hand section of Groundnut, Sunflower and staining of oil droplets
4. Study of plantation crops (Tea and Coffee)
5. Study of condiments and spices (Cardamom, Black Pepper and Chillies)
6. Study of horticultural crops (Banana, Orange and Mango)
7. Study of Vegetable crops (Brinjal, Potato, Onion, Tomato)
8. Study of ornamental plants (Rose and *Chrysanthemum*)

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**B.Sc. III Year (Practical)**  
**Semester –VI**  
**Paper XXII (C)**  
**(Microbiology and Disease Management)**

**(45L)**

1. Study of fungicides as per theory syllabus
2. Preparation of Bordeaux mixture, burgundy mixture and Bordeaux paste
3. Study of insecticides with respect to active ingredient, colour code, formulation, mode of action, antidote and uses
4. Study of *Trichoderma* culture
5. Study of plant protection equipments –pneumatic air pump, knapsack sprayer, mist blower cum duster
6. Principle and working of autoclave, laminar air flow, Tilak air sampler
7. Use of aerobiological techniques to study fungal spora (gravity slide method, Tilak air sampler)
8. Calibration of microscope and measurement of fungal spores
9. Sketching of fungal spore by camera lucida technique
10. Detection of organic acids from healthy and infected leaves by circular paper chromatography
11. Detection of Amino acids from healthy and infected leaves by circular paper chromatography
12. Study of pathogens in fruits from local market
13. Study of fungi from locally available seed samples
14. Preparation of sterile media - nutrient agar, potato dextrose agar
15. Preparation of stains and mounting media - cotton blue, lacto phenol and gram stain

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**B. Sc. III Year (Practical)**

**Semester- VI**

**Paper XXII (D)**

**(Bioinformatics)**

**(45L)**

1. Use of operating system and creation of a job from word processor, spread sheet, presentation and data base
2. Creating files, folders and directories
3. Internet browsing and downloading information with special reference to biological literature
4. Creating an e - mail account, sending and receiving e - mail
5. Graphical presentation of data
6. Computer based statistical techniques
7. Frequency table of single discrete variable
8. Computation of mean, median, and mode
9. Computation of mean deviation, standard deviation, coefficient of variation, variance, and standard error
10. Computation of chi- square test, and t - test
11. Students should undertake a visit biotechnology industry, biotechnology research laboratory

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**DR.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD**

**Faculty of Science**

**Pattern of Theory Question Paper**

**B.Sc. III YEAR (BOTANY)**

**Semester V**

**Paper XV**

**(Cell Biology and Molecular Biology)**

Time: 2 Hours

Max.

Marks: 50

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N.B.: i) Attempt all questions

ii) All questions carry equal marks

iii) Draw neat and well-labelled diagrams wherever necessary

Q.1. Long answer type question .....( Unit 1)

10

Or

Long answer type question .....( Unit 1)

Q.2. Long answer type question .....( Unit 2)

10

Or

Long answer type question .....( Unit 2)

Q.3. Long answer type question .....( Unit 3)

Or

Long answer type question .....( Unit 3)

10

Q.4. Write short notes on: (Any two) **(Based on all Units)**

10

- a) Short answer question
- b) Short answer question
- c) Short answer question
- d) Short answer question

Q.5. Multiple choice question:

10

- 1) .....( Unit 1)
- 2) .....( Unit 1)
- 3) .....( Unit 1)
- 4) .....( Unit 2)
- 5) .....( Unit 2)
- 6) .....( Unit 2)
- 7) .....( Unit 3)
- 8) .....( Unit 3)
- 9) .....( Unit 3)
- 10) .....( Unit 3)

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**DR.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD**

**Faculty of Science**

**Pattern of Theory Question Paper**

**B.Sc. III YEAR (BOTANY)**

**Semester V**

**Paper XVI (A)**

**(Diversity of Angiosperms - I)**

Time: 2 Hours

Max.

Marks: 50

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N.B.: i) Attempt all questions

ii) All questions carry equal marks

iii) Draw neat and well-labelled diagrams wherever necessary

Q.1. Long answer type question .....( Unit 1)

10

Or

Long answer type question .....( Unit 1)

Q.2. Long answer type question .....( Unit 2)

10

Or

Long answer type question .....( Unit 2)

Q.3. Long answer type question .....( Unit 1)

Or

Long answer type question .....( Unit 2)

10

Q.4. Write short notes on: (Any two) (Based on all Units)

10

- a) Short answer question
- b) Short answer question
- c) Short answer question
- d) Short answer question

Q.5. Multiple choice question:

10

- 1) .....( Unit 1)
- 2) .....( Unit 1)
- 3) .....( Unit 1)
- 4) .....( Unit 1)
- 5) .....( Unit 1)
- 6) .....( Unit 2)
- 7) .....( Unit 2)
- 8) .....( Unit 2)
- 9) .....( Unit 2)
- 10) .....( Unit 2)

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**DR.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD**

**Faculty of Science**

**Pattern of Theory Question Paper**

**B.Sc. III YEAR (BOTANY)**

**Semester V**

**Paper XVI (B)**

**(Plant Breeding and Seed Technology)**

Time: 2 Hours

Max.

Marks: 50

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N.B.: i) Attempt all questions

ii) All questions carry equal marks

iii) Draw neat and well-labelled diagrams wherever necessary

Q.1. Long answer type question .....( Unit 1)

10

Or

Long answer type question .....( Unit 1)

Q.2. Long answer type question .....( Unit 2)

10

Or

Long answer type question .....( Unit 2)

Q.3. Long answer type question .....( Unit 1)

Or

Long answer type question .....( Unit 2)

10

Q.4. Write short notes on: (Any two)

**(Based on all Units)**

10

a) Short answer question

b) Short answer question

c) Short answer question

d) Short answer question



Q.5. Multiple choice question.

10

- 1) .....( Unit 1)
- 2) .....( Unit 1)
- 3) .....( Unit 1)
- 4) .....( Unit1)
- 5) .....( Unit 1)
- 6) .....( Unit 2)
- 7) .....( Unit 2)
- 8) .....( Unit 2)
- 9) .....( Unit 2)
- 10) .....( Unit 2)

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**DR.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD**

**Faculty of Science**

**Pattern of Theory Question Paper**

**B.Sc. III YEAR (BOTANY)**

**Semester V**

**Paper XVI (C)**

**(Plant Pathology)**

Time: 2 Hours

Max.

Marks: 50

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N.B.: i) Attempt all questions

ii) All questions carry equal marks

iii) Draw neat and well-labelled diagrams wherever necessary

Q.1. Long answer type question .....( Unit 1)

10

Or

Long answer type question .....( Unit 1)

Q.2. Long answer type question .....( Unit 2)

10

Or

Long answer type question .....( Unit 2)

Q.3. Long answer type question .....( Unit 1)

Or

Long answer type question .....( Unit 2)

10

Q.4. Write short notes on: (Any two) **(Based on all Units)**

10

- a) Short answer question
- b) Short answer question
- c) Short answer question
- d) Short answer question

Q.5. Multiple choice question.

10

- 1) .....( Unit 1)
- 2) .....( Unit 1)
- 3) .....( Unit 1)
- 4) .....( Unit1)
- 5) .....( Unit 1)
- 6) .....( Unit 2)
- 7) .....( Unit 2)
- 8) .....( Unit 2)

9) .....( Unit 2)

10) .....( Unit 2)

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**DR.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD**

**Faculty of Science**

**Pattern of Theory Question Paper**

**B.Sc. III YEAR (BOTANY)**

**Semester V**

**Paper XVI (D)**

**(Biotechnology)**

Time: 2 Hours

Max.

Marks: 50

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N.B.: i) Attempt all questions

ii) All questions carry equal marks

iii) Draw neat and well-labelled diagrams wherever necessary

Q.1. Long answer type question .....( Unit 1)

10

Or

Long answer type question .....( Unit 1)

Q.2. Long answer type question .....( Unit 2)

10

Or

Long answer type question .....( Unit 2)

Q.3. Long answer type question .....( Unit 1)

Or

Long answer type question .....( Unit 2)

10

Q.4. Write short notes on: (Any two) (Based on all Units)

10

- a) Short answer question
- b) Short answer question
- c) Short answer question
- d) Short answer question

Q.5. Multiple choice question.

10

- 1) .....( Unit 1)
- 2) .....( Unit 1)
- 3) .....( Unit 1)
- 4) .....( Unit1)
- 5) .....( Unit 1)
- 6) .....( Unit 2)
- 7) .....( Unit 2)
- 8) .....( Unit 2)
- 9) .....( Unit 2)
- 10) .....( Unit 2)

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**DR.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD**

**Faculty of Science**

**Pattern of Theory Question Paper**

**B.Sc. III YEAR (BOTANY)**

**Semester VI**  
**Paper XIX**  
**(Genetics and Biotechnology)**

Time: 2 Hours

Max.

Marks: 50

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N.B.: i) Attempt all questions

ii) All questions carry equal marks

iii) Draw neat and well-labelled diagrams wherever necessary

Q.1. Long answer type question .....( Unit 1)

10

or

Long answer type question .....( Unit 1)

Q.2. Long answer type question .....( Unit 2)

10

or

Long answer type question .....( Unit 2)

Q.3. Long answer type question .....( Unit 3)

10

or

Long answer type question .....( Unit 3)

Q.4. Write short notes on: (Any two) ( **Based on all units**)

10

a) Short answer question

b) Short answer question

c) Short answer question

d) Short answer question

Q.5. Multiple choice question

10

1) .....( Unit 1)

2) .....( Unit 1)

3) .....( Unit 1)

4) .....( Unit1)

5) .....( Unit 2)

6) .....( Unit 2)

7) .....( Unit 2)

8) .....( Unit3)

9) .....( Unit 3)

10) .....( Unit 3)

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**DR.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD**

**Faculty of Science**

**Pattern of Theory Question Paper**

**B.Sc. III YEAR (BOTANY)**

**Semester VI**

**Paper XX (A)**

**(Diversity of Angiosperms - II)**

Time: 2 Hours

Max.

Marks: 50

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N.B.: i) Attempt all questions

ii) All questions carry equal marks

iii) Draw neat and well-labelled diagrams wherever necessary

Q.1. Long answer type question .....( Unit 1)

10

or

Long answer type question .....( Unit 1)

Q.2. Long answer type question .....( Unit 2)

10

or

Long answer type question .....( Unit 2)

Q.3. Long answer type question .....( Unit 1)

10

or

Long answer type question .....( Unit 2)

Q.4. Write short notes on: (Any two)      **( Based on all units)**

10

- a) Short answer question
- b) Short answer question
- c) Short answer question
- d) Short answer question

Q.5. Multiple choice question

10

- 1) .....( Unit 1)
- 2) .....( Unit 1)
- 3) .....( Unit 1)

- 4) .....( Unit1)
- 5) .....( Unit 1)
- 6) .....( Unit 2)
- 7) .....( Unit 2)
- 8) .....( Unit 2)
- 9) .....( Unit 2)
- 10) .....( Unit 2)

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**DR.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD**

**Faculty of Science**

**Pattern of Theory Question Paper**

**B.Sc. III YEAR (BOTANY)**

**Semester VI**

**Paper XX (B)**

**(Economic Botany)**

Time: 2 Hours

Max.

Marks: 50

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N.B.: i) Attempt all questions

ii) All questions carry equal marks

iii) Draw neat and well-labelled diagrams wherever necessary

Q.1. Long answer type question .....( Unit 1)

10

or

Long answer type question .....( Unit 1)

Q.2. Long answer type question .....( Unit 2)

10

or



Long answer type question .....( Unit 2)

Q.3. Long answer type question .....( Unit 3)

10

or

Long answer type question .....( Unit 3)

Q.4. Write short notes on: (Any two) ( Based on all units)

10

- a) Short answer question
- b) Short answer question
- c) Short answer question
- d) Short answer question

Q.5. Multiple choice question

10

- 1) .....( Unit 1)
- 2) .....( Unit 1)
- 3) .....( Unit 1)
- 4) .....( Unit 2)
- 5) .....( Unit 2)
- 6) .....( Unit 2)
- 7) .....( Unit 3)
- 8) .....( Unit 3)
- 9) .....( Unit 3)
- 10) .....( Unit 3)

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**DR.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD**

**Faculty of Science**

**Pattern of Theory Question Paper**

**B.Sc. III YEAR (BOTANY)**

**Semester VI**

**Paper XX (C)**

**(Microbiology and Disease Management)**

Time: 2 Hours

Max.

Marks: 50

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N.B.: i) Attempt all questions

ii) All questions carry equal marks

iii) Draw neat and well-labelled diagrams wherever necessary

Q.1. Long answer type question .....( Unit 1)

10

or

Long answer type question .....( Unit 1)

Q.2. Long answer type question .....( Unit 2)

10

or

Long answer type question .....( Unit 2)

Q.3. Long answer type question .....( Unit 1)

10

or

Long answer type question .....( Unit 2)

Q.4. Write short notes on: (Any two) (On both unit)

10

- a) Short answer question
- b) Short answer question
- c) Short answer question
- d) Short answer question

Q.5. Multiple choice question

10

- 1) .....( Unit 1)
- 2) .....( Unit 1)
- 3) .....( Unit 1)
- 4) .....( Unit1)
- 5) .....( Unit 1)
- 6) .....( Unit 2)
- 7) .....( Unit 2)
- 8) .....( Unit 2)
- 9) .....( Unit 2)
- 10) .....( Unit 2)

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**DR.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD**

**Faculty of Science**

**Pattern of Theory Question Paper**

**B.Sc. III YEAR (BOTANY)**

**Semester VI**

**Paper XX (D)**

**(Bioinformatics)**

Time: 2 Hours

Max.

Marks: 50

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N.B.: i) Attempt all questions

ii) All questions carry equal marks

iii) Draw neat and well-labelled diagrams wherever necessary

Q.1. Long answer type question .....( Unit 1)

10

or

Long answer type question .....( Unit 1)

Q.2. Long answer type question .....( Unit 2)

10

or

Long answer type question .....( Unit 2)

Q.3. Long answer type question .....( Unit 3)

10

or

Long answer type question .....( Unit 3)

Q.4. Write short notes on: (Any two)      **( Based on all units)**

10

a) Short answer question

b) Short answer question

c) Short answer question

d) Short answer question

Q.5. Multiple choice question

10

- 1) .....( Unit 1)
- 2) .....( Unit 1)
- 3) .....( Unit 1)
- 4) .....( Unit 2)
- 5) .....( Unit 2)
- 6) .....( Unit 2)
- 7) .....( Unit 3)
- 8) .....( Unit 3)
- 9) .....( Unit 3)
- 10) .....( Unit 3)

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**DR.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD**

**Faculty of Science**

**Practical Examination**

**B.Sc. III YEAR (Semester – V &VI)**

**BOTANY**

**Paper XVII and XXI**

**Practical based on paper-XV & XIX**

**(Cell Biology and Molecular Biology, Genetics and Biotechnology)**

Time: 09.00 a.m. to 01.00 p.m.

Max. Marks: 100

Date: \_\_\_\_\_

Batch No.

Center: \_\_\_\_\_

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- Q.1. Prepare a temporary squash of the given material. Identify and describe any two stages. (Mitosis) 15
- Q.2. Prepare a smear from the given material. Identify and describe any one stage (Meiosis) 10
- Q.3 Prepare a temporary squash of the given material. Identify and describe Giant Chromosome. (chironomous larvae) 10  
or  
Prepare of idiogram of the given karyotype and comment.
- Q.4. Prepare a temporary preparation of given material (Cell structure / Cyclosis) 10  
or  
Quiz based on Cell Biology, Molecular Biology, Genetic and Biotechnology (Any ten)
- Q.5. Problem based on interaction of gene. 15
- Q.6. Problem based on sex linked inheritance. 15
- Q.7. Submission
- a) Record book, 10
- b) Woolen models 10
- c) Viva - voce 05

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**DR.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD**

**Faculty of Science**

**Practical Examination**

**B.Sc. III YEAR (Semester – V&VI)**

**BOTANY**

**Paper XVIII and XXII (A)**

**Practical based on paper-XVI & XX**

**(Diversity of Angiosperms – I and II)**

Time: 02.00 a.m. to 06.00 p.m.

Max. Marks: 100

Date: \_\_\_\_\_

Batch No.

\_\_\_\_\_

Center: \_\_\_\_\_

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Q.1. Identify, classify giving reasons and describe the specimen 'A' and 'B' up to family level. Give floral formula and floral diagram

30

Q.2. Identify the specimen 'C' up to the species level with the help of flora. 10

Q.3. Prepare a temporary slide of specimen 'D'

05

Q.4. Prepare a temporary slide of specimen `E` (Pollen grains)

05

Q.5. To determine analytical and synthetic characters between specimen provided

05

Q.6. Identify and describe the specimens as per the instructions (Four spots)

20

(2 Spots- Morphology, 2 Spots-Eco. imp.)

Q.4. Submission:

a) Record book, 10

b) Project report /Tour report and Herbarium  
10

c) Viva - voce 05

\*\*\*\*\*



**Practical Examination**  
**B.Sc. III YEAR (Semester – V&VI)**  
**BOTANY**  
**Paper XVIII and XXII (B)**  
**Practical based on paper-XVI & XX**

**(Plant Breeding, Seed Technology and Economic Botany )**

Time: 02.00 a.m. to 06.00 p.m.

Max. Marks: 100

Date: \_\_\_\_\_

Batch No.

Center: \_\_\_\_\_

---

Q.1. Explain hybridization technique in given plant

20

Q.2. Preparation of seed certification tag

10

Q.3. Viability test of given seeds

10

Q.4. Histochemical test in given material `A`

(Starch/Protein/Lipid/Cellulose/Lignin)

10

Q.5. Identify and describe the specimens B, C, D,E and F as per instructions

25

(B-Plant breeding, C-Seed technology, D, E and F-Economic Botany).

Q.6. Submission:

a) Record book	10
b) Tour report and collection	10
c) Viva - voce	05

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**DR.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD**

**Faculty of Science**

**Practical Examination**

**B.Sc. III YEAR (Semester – V & VI)**

**BOTANY**

**Paper XVIII and XXII (C)**

**Practical based on paper-XVI & XX**

**(Plant Pathology, Microbiology and Disease Management)**

Time: 02.00 a.m. to 06.00 p.m.

Max. Marks: 100

Date: \_\_\_\_\_

Batch No.

Center: \_\_\_\_\_

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Q.1. Identify and describe the symptoms and causal organisms of the specimen 'A' and  
20

'B' Explain on the basis of external and internal characters

Q.2. Calibrate the microscope, measure the given spore and sketch with Camera Lucida  
15  
technique.

Q.3. Identify and describe fungal specimens from culture media/seed fungi/fruit fungi  
10

Q.4. Prepare fungicides as per instructions  
10

Or

Detection of organic acids/amino acids from infected and healthy leaves by circular  
paper chromatography

Q.5. Identify and describe as per instructions (C, D, E, and F)  
20

(C- apparatus, D- pesticide/fungicide, E- diseased plant, F- fungal spore).

Q.6. Submission:

a) Record book

10

b) Project report / Tour report and collection	10
c) Viva - voce	05

\*\*\*\*\*

**DR.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD**

**Faculty of Science**

**Practical Examination**

**B.Sc. III YEAR (Semester – V&VI)**

**BOTANY**

**Paper XVIII and XXII (D)**

**Practical based on paper-XVI & XX**

**(Biotechnology and Bioinformatics)**

Time: 02.00 a.m. to 06.00 p.m.

Max. Marks: 100

Date: \_\_\_\_\_

Batch No.

\_\_\_\_\_

Center: \_\_\_\_\_

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Q.1. Identify the experiment and describe principle and procedure

(Meristem Culture / Anther Culture / Protoplast Culture)

10

Q.2. Separation of amino acids by gel electrophoresis

Or

Identify contaminating bacteria and fungi from the given culture

10

Q.3. Calculate mean, standard deviation, coefficient of variation and standard error

15

of the Provide data

Q.4. Prepare a job using-

15

Word processor/spread sheet/presentation/database

Or

Represent given data by graphical method

Q.5. Identify and describe the given specimens A, B, C, D, E as per instructions

25

Q.6. Submission:

a) Record book

10

b) Project report and Tour report

10

c) Viva - voce

05

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==\*\*==

- 1 -

S-01 &amp; 02 June, 2016 AC after Circulars from Circular No.100 &amp; onwards

- 1 -

**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY****CIRCULAR NO. SU/Sci./B.Sc. Syllabi/100/2016**

It is hereby notified for information to all concerned that, on the recommendation of the Ad-hoc Board in Computer Science and I.T. the Academic Council at its meeting held on 01 & 02 June, 2016 has accepted the following revised syllabi as mentioned against their names under the Faculty of Science :-

Sr. No.	B.Sc. III Year Revised Syllabus	Semester
[1]	B.Sc. Computer Science Degree Course	V & VI
[2]	B.Sc. Information Technology Degree Course	V & VI
[3]	B.C.A. Science Degree Course	V & VI
[4]	B.Sc. Animation Degree Course	V & VI
[5]	B.Sc. Computer Science Optional	V & VI
[6]	B.Sc. Information Technology Optional	V & VI
[7]	B.C.A. Science Optional	V & VI
[8]	B.Sc. Computer Maintenance Optional	V & VI

This is effective from the Academic Year 2016-2017 and onwards.

These syllabi are also available on the University Website [www.bamu.ac.in](http://www.bamu.ac.in)

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/B.Sc./2016/2389-639  
**A.C.M.A.I.No.10**

Date:- 07-06-2016.

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**Director,**  
Board of College and  
University Development.

..2..

- 2 -

S-01 & 02 June, 2016 AC after Circulars from Circular No.100 & onwards

- 2 -

:: [2] ::

**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 Section Officer, [B.Sc. Unit],
- 3] The Section Officer, [B.C.S. Unit],
- 4] The Programmer [Computer Unit-1] Examinations,
- 5] The Programmer [Computer Unit-2] Examinations,
- 6] The In-Charge, E-Suvidha Kendra, [Professional Unit], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr. Babasaheb Ambedkar Marathwada University,
- 7] The Record Keeper,  
Dr. Babasaheb Ambedkar Marathwada University.

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S\*/-0070616/-

- 3 -

**Dr. Babasaheb Ambedkar Marathwada University,  
Aurangabad**

Revised Syllabus of  
**B.Sc. Computer Science**  
**(Optional)**  
Semester – V and VI

Effective from 2016-17



**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad****Curriculum Structure and Scheme of Evaluation: B.Sc. Computer Science (Optional)**

Sr. No.	Course Code	Name of the Subject	Scheme of Teaching			Scheme of Evaluation(Marks)			
			T Hrs/Week	P Hrs/Week	Total Hrs/Week	University Theory Exam.	University Practical Exam.	Duration	Total Marks
<b>Semester V</b>									
1	CSO15	Software Engineering	3		3	50	-	2	50
2	CSO16*	Web Designing	3		3	50	-	2	50
3	CSO16*	VB.Net	3		3	50	-	2	50
4	CSO17	Case Study	-	3	3	-	50	3	50
5	CSO18	Pr. Based on CSO16	-	3	3	-	50	3	50
<b>Total of Semester – V</b>			<b>6</b>	<b>3</b>	<b>9</b>	<b>100</b>	<b>100</b>		<b>200</b>

<b>Semester VI</b>									
<b>1</b>	<b>CSO19</b>	<b>Data Communication and Networking</b>	<b>3</b>		<b>3</b>	<b>50</b>	<b>-</b>	<b>2</b>	<b>50</b>
<b>2</b>	<b>CSO20*</b>	<b>Ethics and Cyber Low</b>	<b>3</b>		<b>3</b>	<b>50</b>	<b>-</b>	<b>2</b>	<b>50</b>
<b>3</b>	<b>CSO20*</b>	<b>E-Commerce</b>	<b>3</b>		<b>3</b>	<b>50</b>	<b>-</b>	<b>2</b>	<b>50</b>
<b>4</b>	<b>CSO21</b>	<b>Seminar</b>	<b>-</b>	<b>3</b>	<b>3</b>	<b>-</b>	<b>20</b>	<b>3</b>	<b>50</b>
<b>5</b>	<b>CSO22</b>	<b>Project</b>		<b>3</b>	<b>3</b>		<b>80</b>		
<b>Total of Semester – VI</b>			<b>6</b>	<b>3</b>	<b>9</b>	<b>100</b>	<b>100</b>		<b>200</b>

\* Indicate optional paper (any one from 2 and 3)

- 6 -

# Semester V

**Paper No.: CSO15**

**Comp. Sci. (Gen.) Semester : V**

**Paper title: Software Engineering**

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**Unit –I**

**Software and Software Engineering**

What is Software, Characteristics of software, categories of Software, attributes of WebApps, software Engineering, Software Process, Essence Software Engineering Practice, General Principles, Software Myths

**Unit –II**

**Software Process and Process Models**

Software process Model Process Flow, Process Models, Waterfall model, Incremental Process Model, Evolutionary Process Models, Concurrent Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Product and Process **Agile**

Introduction to Agility, Agility and the Cost of Change, Agile Process, Agility Principles, Human Factors, Extreme Programming (XP), XP Values, XP Process, Industrial, Critics of XP

**Unit –III**

**Principles That Guide Practice**

Principles That Guide Process, Principles That Guide Practice, Communication Principles, Planning Principles, Modeling Principles, Construction Principles, Deployment Principles

**Books:**

- 1) Software Engineering a Practitioner's Approach By Roger S. Pressman (Seventh Edition) McGraw Hill.
- 1) An Integrated Approach to Software Engineering, Pankaj Jalote, Narosa

**Paper No.: CSO16\***

**Comp. Sci. (Gen.) Semester : V**

**Paper title: Web Designing**

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**Unit –I**

**Introducing HTML5**

Understanding HTML, XHTML, and HTML5, Introducing semantic markup, Syntax, Attributes, Working with elements, Creating an HTML document  
Embedding content, Embedding HTML by using inline frames, Working with hyperlinks, Adding images to your HTML document, Embedding plug-in content

**Advances of HTML5**

HTML5 Layout container  
Format using <div> element  
Working with Tables: creating regular and irregular tables, heading, columns and rows, captions, header, footer.

**Unit –II**

**Introducing JavaScript**

Basic of JavaScript

JavaScript Variables, Operators & Its Precedence, Special Values, Predefined Built-In Functions, Functions Declaration & Call  
String Functions

Conditions and looping structure,

Inline JavaScript & External JavaScript

**Advances in JavaScript**

Object in JavaScript, Concept of array, how to use it in JavaScript, types of an array, array methods

DOM Concept in JavaScript, DOM Objects, DOM Search Methods

Event handling in JavaScript: Capturing & Bubbling, Subscribing, Unsubscribing and Cancelling Event, Windows Event, Keyboard and Mouse Events.

**Unit –III**

**Cascading Style Sheet**

Introduction to CSS3

Defining and Applying a Style, Inline, Embedded and External Style Sheet.

Selectors: element, id and class selector, grouping selector, attribute,

Specificity and cascading

CSS properties: Color, box Model, border, padding, margin, float, clear

**Books and References:**

- 1) Programming in HTML5 with Javascript and CSS3 , Glenn Johnson  
([http://www.daoudisamir.com/references/vs\\_ebooks/html5\\_css3.pdf](http://www.daoudisamir.com/references/vs_ebooks/html5_css3.pdf))
- 2) Beginning HTML5 and CSS3 By Richard Clark, Oli Studholme, Christopher Murphy and Divya Manian. ([http://www.alvinisd.net/cms/lib03/TX01001897/Centricity/Domain/1077/beginning\\_html5\\_and\\_css3.pdf](http://www.alvinisd.net/cms/lib03/TX01001897/Centricity/Domain/1077/beginning_html5_and_css3.pdf))
- 3) A Definitive Guide to HTML5 , By Adam Freeman

**Paper No.: CSO16\***

**Comp. Sci. (Gen.) Semester : V**

**Paper title: VB.NET**

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**Unit –I**

**Introduction:** Introduction to .NET and .NET Framework, Difference between CUI & GUI, Event Driven Programming, the VB IDE, Operators, Conditional statements and looping statements. Sub Procedure, functions and exception handling

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**Unit –II**

**Windows Forms :** General Properties, Events handling events like mouse, keyboard, Types of forms MDI, adding removing controls at run time.  
**Controls :** The control class, Text Box, Rich Text Box, Label, Buttons, Checkbox, Radio Button, Panels, Group Boxes, List Box, Combo Box, Picture Box, Scroll Bars, Splitters, Track Bars, Pickers, Timer.

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**Unit –III**

**Object-Oriented Programming :** Class and Object, Class Vs. Object Members, Creating Classes, Objects, Structures, Modules, Constructors, Data Members, Methods, Properties, Event

**Books and References:**

- 1) Visual Basic .NET Programming Black Book” by Steven Holzner, Dreamtech Press
- 2) “Mastering in Visual Basic .NET” by Evangelos Petroustos, Sybex Publication.

**Paper No.: CSO17**

**Comp. Sci. (Gen.) Semester : V**

**Paper title: Software Engineering Case Study**

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Using any Software engineering model case study on development of a software.

**Paper No.: CSO18**

**Comp. Sci. (Gen.) Semester : V**

- 10 -

**Paper title: Web Designing if Selected**

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1. Create a simple website by using Visual Studio Express
2. Create additional pages
3. Embedding Content
4. Create a webpage using <table> and <div> elements
5. Create a webpages using conditional and looping statements.
6. Create a calculator webpage
7. Create a Webpage to introduce National Bird/Animal/Emblem/Flower
8. Learn more about positioning by adding more <div> elements to the webpage to define a header and footer for the page. Use CSS style rules to set the position.
9. Learn more about CSS selectors by adding more elements to the page and try setting the format by selecting the elements without using an id.
10. Learn more about colors by changing the color scheme, using RGB values.

**Paper No.: CSO18**

**Comp. Sci. (Gen.) Semester : V**

**Paper title: VB.NET if Selected**

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Minimum 12 Practical to be performed as per the guidelines of teaching Faculty depending upon all theory units of concerned subject.

## Semester VI



**Paper No.: CSO19** **Comp. Sci. (Gen.) Semester : VI**  
**Paper title: Data Communication and Networking**

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**Unit –I**

**Introduction**

Communication System, Components of communication system, Computer network Advantage and applications of computer n/w. point-to-point and multipoint line configuration, LAN, MAN and WAN. Analog and Digital signals, Data Transmission: Parallel and Serial, Synchronous and Asynchronous transmission, Transmission Mode: Simplex, half-duplex and full-duplex.

**Network Topologies**

Mesh, Star, Tree, Bus and Ring and Hybrid Topology (Advantages and disadvantages of each)

**Unit –II**

**Transmission media**

Guided and unguided media, Twisted-pair, UTP and STP cable, coaxial cable, Optical Fiber cable, Radio waves, Microwaves, Satellite Communication (*Transmission characteristics and advantages of each type*)

**Modulation & Multiplexing**

Concept of modulation and demodulation, Digital-to-analog conversion, Amplitude Shift Keying (ASK)/AM, Frequency Shift Keying (FSK)/FM, Phase Shift keying (PSK)/PM.

**Unit –III**

**The Mobile Telephone System:**

First Generation(1G), Second Generation(2G), Third Generation(3G), Internet over cable, Spectrum Allocation, cable Modem, ADSL Versus Cable.

**Books:**

- 1) Introduction to Digital and Data Communications, Michal A Miller, JAICO, publishing.
- 2) Data Communication and Networking: C.S.V. Murthy, Himalaya Publishing House
- 3) Data Communication and Networking :: Behrouz A. Forouzan; Mc-Graw Hill Pub.
- 4) Computer Networks by A. S. TANENBAUM, DAVID J. WETHERALL PRENTICE HALL PublicationSoftware

**Paper No.: CSO20\***  
**Paper title: Ethics and Cyber Law**

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**Comp. Sci. (Gen.) Semester : VI**

**Unit –I**

- 13 -

: Basic Concepts of Technology and Law, Understanding the Technology of Internet, :  
: Scope of Cyber Laws, Cyber Jurisprudence. Law of Digital Contracts The Essence of :  
: Digital Contracts. :

**Unit –II**

: The System of Digital Signatures. The Role and Function of Certifying Authorities. :  
: The Science of Cryptography, E-Governance, Cyber Crimes and Cyber Laws. :  
: Introduction to Intellectual Property. :

**Unit –III**

**Information Technology Act 2000 Cyber Law**

Issues in E-Business Management. Major issues in Cyber Evidence Management, :  
: Cyber Law Compliancy Audit, The Ethics of Computer Security. Relevant Rules :  
: Notifications, Information Technology (Amendment) Act, 2008. :

**Books and References:**

- 1) Godbole, "Information Systems Security", Willey
- 2) Merkov, Breithaupt, "Information Security", Pearson Education
- 3) Yadav, "Foundations of Information Technology", New Age, Delhi
- 4) Schou, Shoemaker, "Information Assurance for the Enterprise", Tata McGraw Hill
- 5) Sood, "Cyber Laws Simplified", Mc Graw Hill
- 6) Furnell, "Computer Insecurity", Springer A Definitive Guide to HTML5, By Adam Freemans

**Paper No.: CSO20\***

**Comp. Sci. (Gen.) Semester : VI**

**Paper title: E-Commerce**

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**: Unit –I**

Introduction, IT and business, E-commerce: Concepts Electronic Communication, PCs and Networking, E-mail, Internet and intranets. EDI to E-commerce, EDI, UN/EDIFACT

**: Unit –II**

Concerns for E-commerce Growth, Internet bandwidth, Technical issues, Security issues. India E-commerce Readiness, Legal issues, Getting started. Security Technologies: Encryption, Symmetric key Encryption, Public key encryption, Public key encryption using digital Signatures. Hashing techniques, Certification and key Distribution, Cryptographic.

**: Unit –III**

The elements of E-commerce. SSL-Secure Socket Layer, SET-Secure Electronic Transaction Protocol for Credit card payment, E-Cash, E-check, Smart cards. Electronic Payment System: Digital Cash, Digital Wallets, Digital checking payment systems, Electronic Billing, Wireless payment systems. Software Package: PGP e-mail encryption software

**Books and References:**

- 1) E-Commerce: The Cutting Edge of Business, Kamlesh K. Bajaj & Debjani Nag, Tata McGraw Hill.
- 2) E- Commerce Strategy , Technologies and Applications, David Whiteley, McGraw Hill Edition
- 3) E- Security, Electronic Authentication and Information Systems Security Sundeep Oberoi, TMG
- 4) E-Commerce Concepts, Models , Strategies by - G.S.V Murthy
- 5) E-Commerce- Kenneth C.Laudon and Carol Guercio Traver
- 6) Internet marketing and E-commerce-Ward Hanson and Kirthi Kalyanam

**Paper No.: CSO21**

**Comp. Sci. (Gen.) Semester : VI**

**Paper title: Seminar**

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- 15 -

Student should prepare and present a seminar on any latest topic should be related to Computer Science.

**Paper No.: CSO22**

**Comp. Sci. (Gen.) Semester : VI**

**Paper title: Major Project**

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Students group (maximum 3 students) should design and develop a project.

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

२२-50th May, 20२० २०२० for Circulation Date Circular No.1 & onwards - 7 -

२०२०

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Dr. Babasaheb Ambedkar Marathwada University

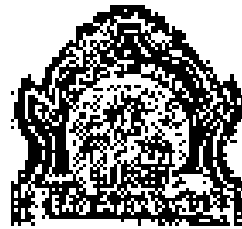
**Copy to :-**

- 1] The Controller of Examinations,
- 2] The Director, [B Survidha Kendra], in-charge 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.

२०२०-२०२०/२०२०-

**DR. BABASAHEB AMBEDKAR  
MARATHWADA UNIVERSITY,  
AURANGABAD**

**B. Sc. (THIRD YEAR)**



**SYLLABUS**

**B.Sc. FIFTH & SIXTH SEMESTER**

**[ELECTRONICS (OPTIONAL)]**

**{Effective from – June – 2015 onwards}**

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad  
2

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**B.Sc. Electronics (Optional) Third Year Course Structure in Semester**  
**System**

**B.Sc. Third Year**

Semester	Course Code	Paper Number	Title of Paper	Marks
V	ELE-501	Paper XV	POWER ELECTRONICS	50
	ELE-502A OR ELE-502B	Paper XVI (A) OR XVI (B)	(A) MICROCONTROLLER – I OR (B) 8085 INTERFACING – I	50
	ELE-503	Paper XVII	Practicals based on Paper XV	50
VI	ELE-504 A OR ELE-504 B	Paper XVIII (A) OR XVIII (B)	Practicals based on Paper XVI (A) OR Practicals based on Paper XVI (B)	50
	ELE-501A OR ELE-501B	Paper XIX (A) OR XIX (B)	(A) PROGRAMMABLE LOGIC CIRCUITS OR (B) INSTRUMENTATION	50
	ELE-502A OR ELE-502B	Paper XX (A) OR XX (B)	(A) MICROCONTROLLER – II OR (B) 8085 INTERFACING – II	50
	ELE-503 A OR ELE-503 B	Paper XXI (A) OR XXI (B)	Practicals based on Paper XIX (A) OR Practicals based on Paper XIX (B)	50
	ELE-504 A OR ELE-504 B	Paper XXII (A) OR XXII (B)	Practicals based on Paper XX (A) OR Practicals based on Paper XX (B)	50



**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**

**B. Sc. Fifth Semester**

**Subject: ELECTRONICS**

**Course: ELE 501**

**Paper: XV**

**(Effective from June 2015)**

**Title: POWER ELECTRONICS**

**Marks: 50**

**Periods: 45**

- 1. Thyristors (12)**  
Silicon Controlled Rectifiers { Construction, Operation, Equivalent Circuit, Characteristics}; Junction Transistors, Bias, Time, IGBTs
- 2. Detection Sensors (12)**  
Limit Switches, Proximity Detectors, Inductive Proximity Switches (Ports, Output Stages, Operation); Capacitive Proximity Switches, Photoelectric Sensors, Methods of Detection, Operating Specifications, Sensor Interfacing ( Electromagnetic Relays, Resistive Load, Inductive Load, Solid State Relay, Two Wire System)
- 3. D C Drives: (09)**  
DC Drive Fundamentals, Variable Voltage DC Drive, Motor Braking
- 4. A C Drives (12)**  
AC Drive Fundamentals, AC Drive System, Drive Controller Internal Circuitry, Circuit Operation of AC Drive, PWM Control Methods, Control Panel Inputs Drive functions, Inverter Self Protection Function, Motor Braking

**Books Recommended**

1. Industrial Electronics { Circuits, Instruments and Control Techniques} – Terry Bittel, DELMAR, Cengage Learning India Pvt. Ltd, Delhi, 2009
2. Introduction to Power Electronics – V Jagannathan, PHI, New Delhi, 2004
3. Power Electronics – M D Singh and K B Khanchandani,

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**

**B. Sc. Fifth Semester**  
**Subject: ELECTRONICS**

**Course: E.EE-502 A**

**Paper XVI (A)**

**(Offerive from June 2015)**

**Title: MICROCONTROLLER I**

**Marks: 50**

**Periods: 45**

**1. 8051 Microcontroller (15)**

Introduction, Microcontrollers and microprocessors, history of microcontrollers, embedded versus external memory devices, 8-bit and 16-bit microcontrollers, CISC and RISC processors, Harvard and Von Neumann architecture, commercial microcontroller devices, Features of 8051 Microcontroller, MCS-51 architecture, Registers in MCS-51, 8051 Pin Description, Memory Organization

**2. Addressing Modes and Instructions (09)**

8051 Addressing Modes, MCS – 51 Instruction Set, 8051 Instructions and Sample Programmes, Using Stack Pointer

**3. Interrupts, Timers/Counters and Serial Communication (07)**

Interrupts, Interrupts in MCS – 51, Timers and Counters, Serial Communication

**4. Applications of MCS – 51 (12)**

Pin diagrams of 80C51 and 89C 2051, Square Wave Generation, Pulse Generation, Sine-wave Ramp Generation, Pulse Width Measurement

**Books Recommended:**

1. Microcontrollers [Theory and Applications] - Ajay Deshmukh, TMH, New Delhi, 2006
2. The 8051 Microcontroller and Embedded system - M.A Muzadi, J.G Mazaedi and R.D MacKinnay, Pearson PHI, 2009
3. The 8051 Microcontroller - K.G Ayala, DPH/MAR, Cengage Learning India Pvt. Ltd, Delhi, 2008

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**

**B. Sc. Fifth Semester  
Subject: ELECTRONICS**

**Course: ELE-502B**

**Paper XVI (B)**

**(Effective from June 2015)**

**Title: 8085 INTERFACING – I**

**Marks: 50**

**Periods: 45**

1. **Semiconductor Memories and Interfacing (15)**  
Semiconductor Memories, Introduction to Memory Interfacing, Memory Organization, Using Decoder for Chip Select Logic, Interfacing Design (Problem 1 to 5)
2. **Programmable Peripheral Interface PPI – 8255 (15)**  
Introduction, 8255 Functions, Block Diagram, 8255 Initialization, I / O Operating Modes
3. **Programmable Communication Interface – 8251 (15)**  
Introduction to 8251, Pin Description, 8251 Block Diagram and Functional Description, 8251 Control Word, 8251 Data Transfer Operation, Asynchronous Mode: Transmitter, Asynchronous Mode: Receiver, Synchronous Mode: Transmitter, Synchronous Mode: Receiver, 8251 Status Word

**Books Recommended:**

1. 8 - Bit Microprocessor System Design – V J Vitshute and P B Bowale, Technova Publications, Pune
2. Microprocessor Architecture, Programming and Applications with 8085 Ramesh S Gaoutan, Penram International Publishing

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**

**B. Sc. Fifth Semester**  
**Subject: ELECTRONICS**

**Course: EEE-503**

**Paper XVII (Practicals)**

**(Effective from June 2015)**  
**Practicals Based on Paper XV**

Every candidate appearing for examination must produce journal showing that he/she has completed Six (06) experiments during the semester. The journal must be verified at the end of the semester by The Head of the Department.

**Experiments**

**(Marks 50)**

1. Study of SCR characteristics.
2. Study of UJT characteristics.
3. Study of DIAC characteristics.
4. Study of TRIAC characteristics.
5. Study of GDT characteristics.
6. Study of firing of two SCRs using one UJT for power control.
7. Study of Triac as light dimmer.
8. Half wave & full wave rectifier using SCR.
9. Temperature sensitive switch using thermistor.
10. UJT relaxation oscillator.
11. Timer using SCR & UJT
12. Study of Inductive Switch.
13. Study of Capacitive Switch.

3. Final CGPA (2015-16) will be determined on the basis of marks (24) and Year mark (6) only.

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**

**D. Sc. Fifth Semester**

Subject: **ELECTRONICS**

Course: **CE.E-S04A**

Paper **XVIII (A) (Practicals)**

(Effective from June 2015)

Practicals Based on Paper XVI (A)

Every candidate appearing for examination must produce journal showing that he/she has completed *Approx* 104 experiments during the semester. The journal must be verified at the end of the semester by The Head of the Department.

**(A) Experiments**

**(Marks 30)**

1. Write a program to blink LED with 0.5 Hz frequency and implement it using Atmel 89C51.
2. Write a program for 8-bit up counter and implement it using Atmel 89C51.
3. Write a program for 8-bit binary down counter and implement it using Atmel 89C51.
4. Write a program to interface a switch and 8 LEDs for binary up counter when switch is closed and pause the counter when switch is open. implement it using Atmel 89C51.
5. Write a program to generate square waveform using Atmel 89C51 and implement it.
6. Write a program for pulse generation using Atmel 89C51 and implement it.
7. Write a program for pulse width measurement using Atmel 89C51 and implement it.

**(B) Project**

**(Marks 20)**

Every student should construct one *Useful* project. He/she should submit the project and project report thereon at the time of practical examination. The project report must be certified at the end of the semester by The Head of the Department.

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**

**B. Sc. Fifth Semester  
Subject: ELECTRONICS**

**Course: ELE-504 E**

**Paper XVIII (B) (Practicals)**

**(Effective from June 2015)  
Practicals Based on Paper XVI (B)**

Every candidate appearing for examination must produce journal showing that he/she has completed *Four* (04) experiments during the semester. The journal must be certified at the end of the semester by The Head of the Department.

**(A) Experiments**

**(Marks 30)**

1. Write an assembly language program (ALP) to interface 8141K and 8 switches to display status of switch using 8255 and implement it.
2. Write an assembly language program (ALP) to interface Hex keyboard and seven segment display to display key pressed on 85D using 8255 and implement it.
3. Write an assembly language program (ALP) to generate square wave outputs of frequency 500 Hz using DAC 0800 with 8255 and 8085 microprocessor, implement it.
4. Write an assembly language program for 8 -Bit binary up counter and implement it using 8255.
5. Write an assembly language program for 8 -Bit binary down counter and implement it using 8255.

**(B) Project**

**(Marks 20)**

Every student should construct one *Notable* project. He/she should submit the project and project report thereon at the time of practical examination. The project report must be certified at the end of the semester by The Head of the Department.

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**

**B. Sc. Sixth Semester  
Subject : ELECTRONICS**

**Course: ELE-601A**

**Paper: XIX (A)**

**(Effective from June 2015)**

**Title: PROGRAMMABLE LOGIC CONTROLLERS**

**Marks: 50**

**Periods: 45**

- 1. Introduction to Programmable Controllers (15)**  
Industrial Motor Control circuits, Relay Ladder Logic Circuits, building a Ladder Diagram, Rack Assembly, Power Supply, PLC Programming Unit, Input / Output Sections, Processor Unit, Addressing, Relationship of Data File Addresses to I / O Modules.
- 2. Fundamental PLC Programming (15)**  
PLC Program Execution, Ladder Diagram programming Language, Ladder Diagram Programming, Relay logic Instructions, Timer Instructions, Counter Instructions, Data Manipulation Instructions, Arithmetic Operations, Writing a Program.
- 3. Advanced Programming, PLC Interfacing and Troubleshooting (15)**  
Jump Commands, Data Manipulations, Discrete Input / Output Modules, Troubleshooting I / O functions.

**Books Recommended**

1. Industrial Electronics ( Circuits, Instruments and Control Techniques) – Terry Dorteil, DMC/MAR, Cengage Learning India Pvt. Ltd. Delhi, 2009
2. Introduction to Power Electronics – V Jagannathan, PHI, New Delhi, 2004
3. Power Electronics – M D Singh and K B Khanchaudani,

8. EFFECTIVE DATE 2015-16. ALL SECTIONS SHOULD USE PREVIOUS EDITIONS. EFFECTIVE DATE 2015-16

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**

**B. Sc. Sixth Semester**  
**Subject : ELECTRONICS**

**Course: ELE-601 B**

**Paper XIX (B)**

**{Effective from June 2015}**

**Title: INSTRUMENTATION**

**Marks: 50**

**Periods: 45**

1. **Qualities of Measurements** (10)  
Performance Characteristics, Static Characteristics, Errors in Measurement, Types of Metric Errors, Sources of Errors, Dynamic Characteristics, Standard, Atomic Frequency and Time Standards.
2. **Displays and Recorders** (15)  
LED display, LCD display, X-Y recorder, Magnetic Tape recorder, Frequency modulation recording, Digital data recording.
3. **Transducers** (20)  
Electrical transducers: selecting a transducer, Resistive transducer, Resistive position transducer, Inductive transducer, Differential output transducer, Linear variable differential transducer(LVDT), Capacitive (pressure) transducer, Gas Cell, Piezo- electric transducer.  
Photo electric transducers: - photo multiplier tube, photo cells, photo voltaic cell, semiconductor photo diode, photo transistor.  
Temperature transducers:- RTD, Resistance thermometer, Thermistor, Thermocouple.

**Books Recommended**

1. Electronic Instrumentation –Second edition. by H.S.Kasi (Mc Graw Hill Company)
2. Transducers and Instrumentation by D V S Murty (PHI)



**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**

**B. Sc. Sixth Semester  
Subject: ELECTRONICS**

**Course: E.E-602 A**

**Paper – XX (A)**

**(Effective from June 2015)**

**Title: MICROCONTROLLER – II**

**Marks: 50**

**Periods: 45**

- 1. 8051 Timer Programming in Assembly Language (9 periods)**  
Programming 8051 Timers, Counter Programming,
- 2. 8051 Serial Port Programming in Assembly Language (12 periods)**  
Basics of Serial Communication, 8051 Connection to RS232, 8051 Serial Port Programming in Assembly
- 3. Interrupts Programming in Assembly Language (12 periods)**  
8051 Interrupts, Programming Timer Interrupts, Programming External Hardware Interrupts, Interrupt Priority in the 8051 / 8052
- 4. I/O, Keyboard, A/D, D/A and Sensor Interfacing (12 periods)**  
LCD Interfacing, ADC {0809}, DAC {0808} Interfacing, Sensor Interfacing and Signal Conditioning {LM34 and LM35}

**Books Recommended:**

1. The 8051 Microcontroller and Embedded system – M A Mazadi, J G Mazadi and R D McKinlay, Pearson PHI, 2009
2. The 8051 Microcontroller – K J Ayala, DELMAR, Cengage Learning India Pvt. Ltd, Delhi, 2006
3. Microcontrollers | Theory and Applications – Ajay Deshpande, TMH, New Delhi, 2009

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L2

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**

**B. Sc. Sixth Semester  
Subject : ELECTRONICS**

Course: **EEEC-602B**

Paper – **XX (18)**

(Effective from June 2015)

**Title: 8085 INTERFACING II**

Marks: **50**

Periods: **45**

- 1. 8253 / 8254 Programmable Interval Timer (15)**  
Introduction, Features of Programmable Interval Timer, Piv Configuration of 8253 / 8254, 8253 / 8254 Functional Block Diagram, Control Word Register Format, Modes of Operation, 8253 Write Operation, 8253 Read Operation
- 2. DMA Controlled I/O and DMA Controller (15)**  
Introduction, Requirements of DMA Controlled Input / Output, The DMA Controller, Programmable DMA controller 8257, Organization, Operating Modes of 8257
- 3. Interrupt System and Controller (15)**  
The 8259 Interrupt Controller, Organization, 8259 – A Programming, command Words of 8259 – A, Single PIC System, Cascaded PICs System (Vectored Mode), Polled System

**Books Recommended:**

1. **X-86 Microprocessor System Design** – V J Vithate and P B Barole, Techreva Publications, Pune
2. **Microprocessor Architecture, Programming and Applications with 8085** – Ramesh S Gaonkar, Pentam International Publishing

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**

**B. Sc. Sixth Semester  
Subject : ELECTRONICS**

**Course: ELE-603 A**

**Paper : XXI (A)**

**(Effective From June 2015)**

**Practicals Based on Paper : XXI (A)**

Every candidate appearing for examination must produce journal showing that he/she has completed Four (04) experiments during the semester. The journal must be certified at the end of the semester by The Head of the Department.

**VII - A: Experiments**

**(Marks 30)**

1. Study of Water Level Controller, Using PLC Simulator.
2. Study of Traffic Light Control, Using PLC Simulator.
3. Study of Horizontal Motion of Conveyor Belt using Limit Switches, Using PLC Simulator.
4. Study of Lift Control, Using PLC Simulator.
5. Study of Bottling Plant with Counter, Using PLC Simulator.

**VII - B: Project**

**(Marks 20)**

Every student should construct one Scientific project. He/she should submit the project and project report thereon in the time of practical examination. The project report must be certified at the end of the semester by The Head of the Department.

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**Dr. Balusubrahmanyan Murthywada University, Anantnagar**

**B. Sc. Sixth Semester**  
**Subject: ELECTRONICS**

**Course: UJ.E-603 B**

**Paper – XXI (B)**

**(Effective from June 2015)**

**Practicals Based on Paper – XIX (B)**

Every candidate appearing for examination must produce journal showing that he/she has completed *Four* (04) experiments during the semester. The journal must be certified at the end of the semester by The Head of the Department.

**A: Experiments**

**(Marks 30)**

1. Study of IC AD590 as Temperature sensor.
2. Study of PT100 as Temperature sensor.
3. Study of Thermistor as Temperature sensor.
4. Study of photo transistor & photo diode as light sensor
5. Study of photo voltaic cell & LDR as light sensor
6. Study of temperature sensing transducer.
7. Study of strain gauge based over

**B: Project**

**(Marks 20)**

Every student should construct one *Signable* project. He/she should submit the project and project report thereon at the time of practical examination. The project report must be certified at the end of the semester by The Head of the Department.

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**

**B. Sc. Sixth Semester  
Subject : ELECTRONICS**

**Course: IJ.E-604A**

**Paper : XXII (A)**

**(Effective from June 2015)**

**Practicals Based on Paper : XX (A)**

Every candidate appearing for examination must produce journal showing that he/she has completed Six (06) experiments during the semester. The journal must be certified at the end of the semester by The Head of the Department.

**Experiments**

**(Marks 50)**

1. Write a program to generate square waveforms and implement it using Atmel 89C51 with DAC.
2. Write a program to generate waveforms and implement it using Atmel 89C51 with DAC.
3. Write a program to generate triangular waveform with period of 1ms and implement it using Atmel 89C51 with DAC.
4. Write a program for stepper motor direction control using a switch and implement it using Atmel 89C51.
5. Write a program to display Microcontroller on 2 × 8 LCD module and implement it using Atmel 89C51.
6. Interfacing of matrix keyboard using MCS – 51.
7. Program based on MCS – 51 TIMER.
8. Program based on MCS – 51 COUNTER.
9. Program based on MCS – 51 INTERRUPTS.
10. Temperature Controller with MCS – 51.

3. ENPW 02 June 2015-16. A' Yella, 2015. Prasang. Babasaheb Ambedkar Marathwada University, Aurangabad. Sem.V & VI. Page -

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**

**B. Sc. Sixth Semester  
Subject : ELECTRONICS**

**Course: ELE-604B**

**Paper – XXII (B)**

**(Collective from June 2015)  
Practicals Based on Paper – XX (B)**

Every candidate appearing for examination must produce journal showing that he/she has completed 5% (06) experiments during the semester. The journal must be certified at the end of the semester by The Head of the Department.

**Experiments**

**(Marks 50)**

1. Study of decoder.
2. Study of 8253 in mode '0'.
3. Study of 8253 in mode '1'.
4. Study of 8253 in mode '2'.
5. Study of 8253 in BSR Mode.
6. Interfacing of A/D with 8255.
7. Interfacing of stepper motor by  
(a) Clockwise rotation  
(b) Anti clockwise rotation
8. Interfacing of LCD using 8255.

3 [P/E/22 June-2015] Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (P.E.) IIIrd Year Sem.V & VI  
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**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**

**B. Sc. FIFTH SEMESTER**

**Subject: ELECTRONICS**

**Course: EL16-501**

**Paper: XV**

**(Effective from June 2015)**

**Title: POWER ELECTRONICS**

**PAPER PATTERN (THEORY)**

*Time: Two Hours*

*Max. Marks: 50*

- 
- 
- N.B.:** (i) Attempt All questions.  
(ii) All questions carry equal marks.  
(iii) Use only Blue or Black pen.  
(iv) Draw flow charts wherever necessary.
- 
- 

**Q.1** Attempt any one:

- (a) Chapter No. 1 (10)  
(b) Chapter No. 2 (10)

**Q.2** Attempt any one:

- (a) Chapter No. 2 (10)  
(b) Chapter No. 3 (10)

**Q.3** Attempt any one:

- (a) Chapter No. 4 (10)  
(b) Chapter No. 1 (10)

**Q.4** Write short notes on any TWO:

- (a) Chapter No. 1 (05)  
(b) Chapter No. 2 (05)  
(c) Chapter No. 3 (05)  
(d) Chapter No. 4 (05)

**Q.5** Attempt the following: (10)

TEN MULTIPLE CHOICE QUESTIONS SHOULD BE ASKED (WITH SINGLE CORRECT ANSWER) (FIVE EACH AT LEAST TWO MCQs ON EACH CHAPTER)

**Dr. Bahasaheb Anbedkar Marathwada University, Aurangabad**

**B. SC. FIFTH SEMESTER**

**Subject : ELECTRONICS**

**Course: ELE-501 A                      Paper XVI (A)**  
**(Effective from June 2015)**

**Title: MICROCONTROLLER – I**

**PAPER PATTERN (MEMORY)**

*Time: Two Hours*

*Total Marks: 50*

- 
- N.B.:**
- (i) Attempt All questions.
  - (ii) All questions carry equal marks.
  - (iii) Use only Blue or Black pen.
  - (iv) Draw flow charts wherever necessary.
- 

**Q.1** Attempt any one:

- (a) Chapter No. 1 (10)
- (b) Chapter No. 2 (10)

**Q.2** Attempt any one:

- (a) Chapter No. 2 (10)
- (b) Chapter No. 3 (10)

**Q.3** Attempt any one:

- (a) Chapter No. 4 (10)
- (b) Chapter No. 4 (10)

**Q.4** Write short notes on any 1 WQ:

- (a) Chapter No. 1 (05)
- (b) Chapter No. 2 (05)
- (c) Chapter No. 3 (05)
- (d) Chapter No. 4 (05)

**Q.5** Attempt the following: (10)

TEN MULTIPLE CHOICE QUESTIONS & SHOULD BE ASKED WITH SINGLE CORRECT ANSWER. (MAYBE AT LEAST TWO WORDS ON EACH CHAPTER)



3 PAPER 02 June 2015 16 M. S. Ghoshalkar, P. S. Joshi, P. S. Patil and V. S. Patil

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**

**B. SC. PAPER SEMESTER V**

**Subject : ELECTRONICS**

**Course: EL0-502 B**

**Paper XVI (16)**

**(Effective from June 2015)**

**Title: 8085 INTERFACING - I**

**PAPER PATTERN (THEORY)**

*Time: Two Hours*

*Max. Marks: 50*

- 
- 
- N.B.:** (i) Attempt **All** questions.  
(ii) All questions carry equal marks.  
(iii) Use only Blue or Black pen.  
(iv) Draw flow charts whenever necessary.
- 
- 

**Q.1** Attempt any one:

- (a) Chapter No. 1 (10)  
(b) Chapter No. 1 (10)

**Q.2** Attempt any one:

- (a) Chapter No. 2 (10)  
(b) Chapter No. 2 (10)

**Q.3** Attempt any one:

- (c) Chapter No. 3 (10)  
(b) Chapter No. 3 (10)

**Q.4** Write short notes on any TWO:

- (ii) Chapter No. 1 (05)  
(b) Chapter No. 2 (05)  
(c) Chapter No. 3 (05)  
(c) Chapter No. 3 (05)

**Q.5** Attempt the following: (10)

**FIVE MULTIPLE CHOICE QUESTIONS SHOULD BE ASKED WITH SINGLE CORRECT ANSWER [FURTHER AT LEAST THREE MCQs ON EACH CHAPTER]**

**Dr. Bahasaheb Ambedkar Marathwada University, Aurangabad**

**B. SC. SIXTH SEMESTER**

**Subject : ELECTRONICS**

**Course: EJE-601 A**

**Paper -- XIX (a)**

**(Revised from June 2015)**

**Title: PROGRAMMABLE LOGIC CONTROLLERS**

**PAPER PATTERN (CATEGORY)**

**Time: Two Hours**

**Max. Marks: 50**

- 
- 
- N.B.:** (i) Attempt All questions.  
(ii) All questions carry equal marks.  
(iii) Use only Blue or Black pen.  
(iv) Draw flow charts wherever necessary.
- 
- 

**Q.1** Attempt any one:

- (a) Chapter No. 1 (10)  
(b) Chapter No. 2 (10)

**Q.2** Attempt any one:

- (a) Chapter No. 3 (10)  
(b) Chapter No. 2 (10)

**Q.3** Attempt any one:

- (a) Chapter No. 3 (10)  
(b) Chapter No. 3 (10)

**Q.4** Write short notes on any TWO:

- (a) Chapter No. 1 (05)  
(b) Chapter No. 2 (05)  
(c) Chapter No. 3 (05)  
(d) Chapter No. 1 / 2 / 3 (05)

**Q.5** Attempt the following. (10)

TEN MULTIPLE CHOICE QUESTIONS SHOULD BE ASKED WITH SINGLE CORRECT ANSWER. FURTHER AT LEAST **THREE MCQs** ON EACH CHAPTER.

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**

**B. SC. SIXTH SEMESTER**

**Subject : ELECTRONICS**

**Course: ELE-601 B                      Paper – XIX (B)**  
**(Effective from June 2015)**

**Title: INSTRUMENTATION**

**PAPER PATTERN (THEORY)**

**Time: Two Hours**

**Max. Marks: 50**

- 
- N.B.:**
- (i) Attempt All questions.
  - (ii) All questions carry equal marks.
  - (iii) Use only Blue or Black pen.
  - (iv) Draw flow charts, wherever necessary.
- 

**Q.1 Attempt any one.**

- (a) Chapter No. 1 (10)
- (b) Chapter No. 1 (10)

**Q.2 Attempt any one.**

- (a) Chapter No. 2 (10)
- (b) Chapter No. 2 (10)

**Q.3 Attempt any one:**

- (a) Chapter No. 3 (10)
- (b) Chapter No. 3 (10)

**Q.4 Write short notes on any TWO:**

- (a) Chapter No. 1 (05)
- (b) Chapter No. 2 (05)
- (c) Chapter No. 3 (05)
- (d) Chapter No. 3 (05)

**Q.5 Attempt the following: (10)**

YES MULTIPLE CHOICE QUESTIONS SHOULD BE ASKED WITH SINGLE CORRECT ANSWER. FURTHER AT LEAST **THREE** MCQs ON EACH CHAPTER.

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**

**B. SC. SIXTH SEMESTER**

**Subject : ELECTRONICS**

**Course: B.E.-602 A**

**Paper XX (A)**

**(Effective from June 2015)**

**Title: MICROCONTROLLER – II**

**PAPER PATTERN CATEGORY)**

*Time: Two Hours*

*Max. Marks: 50*

- 
- NOTE:**
- (i) Attempt All questions.
  - (ii) All questions carry equal marks.
  - (iii) Use only Blue or Black pen.
  - (iv) Draw flow charts wherever necessary.
- 

**Q.1** Attempt any one:

- (a) Chapter No. 1 (10)
- (b) Chapter No. 2 (10)

**Q.2** Attempt any one:

- (a) Chapter No. 3 (10)
- (b) Chapter No. 5 (10)

**Q.3** Attempt any one:

- (a) Chapter No. 4 (10)
- (b) Chapter No. 1 (10)

**Q.4** Write short notes on any TWO:

- (a) Chapter No. 1 (05)
- (b) Chapter No. 2 (05)
- (c) Chapter No. 3 (05)
- (d) Chapter No. 4 (05)

**Q.5** Attempt the following: (10)

BY MULTIPLE CHOICE QUESTIONS & SHOULD BE ASKED WITH SINGLE CORRECT ANSWER. [FURTHER AT LEAST TWO MCQs ON EACH CHAPTER]

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**

**B. SC. SIXTH SEMESTER**

**Subject : ELECTRONICS**

**Course: ELP-602 B Paper XX (B)**

**(Effective from June 2015)**

**Title: 8085 INTERFACING – II**

**PAPER PATTERN (THEORY)**

*Time: Two Hours*

*Max. Marks: 50*

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<b>NOTE:</b>	(i) Attempt All questions.	
	(ii) All questions carry equal marks.	
	(iii) Use only Blue or Black pen.	
	(iv) Draw flow charts wherever necessary.	

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<b>Q.1</b>	Attempt any one:	
(a)	Chapter No. 1	(10)
(b)	Chapter No. 1	(10)
<b>Q.2</b>	Attempt any one:	
(a)	Chapter No. 2	(10)
(b)	Chapter No. 2	(10)
<b>Q.3</b>	Attempt any one:	
(a)	Chapter No. 3	(10)
(b)	Chapter No. 3	(10)
<b>Q.4</b>	Write short notes on any TWO:	
(a)	Chapter No. 1	(05)
(b)	Chapter No. 2	(05)
(c)	Chapter No. 3	(05)
(d)	Chapter No. 4	(05)
<b>Q.5</b>	Attempt the following:	(10)
	TEN MULTIPLE CHOICE QUESTIONS SHOULD BE ASKED WITH SINGLE CORRECT ANSWER. FURTHER AT LEAST <b>THREE MCQs</b> ON EACH CHAPTER]	

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

14-50th May, 2023 SAC's for Circulars from Director Sec.1 & onwards - 7 -

2

**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, [R Survidha Kendra], in-charge 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.

887-160616/-

**DR. BABASAHEB AMBEDKAR MARATHWADA  
UNIVERSITY AURANGABAD.**



Syllabus of  
B.Sc. – Third Year  
(Fishery Science) (Opt.)  
(Semester – V and VI)  
(Effective from June 2015 and on wards)

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**BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY AURANGABAD**  
**SYLLABUS**  
**B.Sc. – III (FISHERY SCIENCE)**  
**(Revised syllabus effective from June 2015)**  
**V and VI Semester**

**COURSE STRUCTURE**

Semester	Course code	paper	Title of the paper	Periods	Mark
V	Fish. Sci. 115	XV	Fishery Economics	45	50
V	Fish. Sci. 116	XVI	Modern Trends in Fishery Sci.	45	50
V	Fish. Sci. 117	XVII	Practical based on paper XV	45	50
V	Fish. Sci. 118	XVIII	Practical based on paper XVI	45	50
VI	Fish. Sci. 119	XIX	Fish statistics Management and Extension	45	50
VI	Fish. Sci. 120	XX	Modern Trends in Fishery Sci. II	45	50
VI	Fish. Sci. 121	XXI	Practical based on paper XIX	45	50
VI	Fish. Sci. 122	XXII	Practical based on XX	45	50

Dr. M.G. Bhatnagar  
 (Consultant, B.O.S. in Fisheries)

**B.Sc. III (Fishery Science)  
Semester V  
Paper XV  
Fish Economics**

<b>Unit A: 1. Economic Terminology</b>	<b>10</b>
<ol style="list-style-type: none"> <li>1. Scarcely</li> <li>2. Choice</li> <li>3. Scale of Preference</li> <li>4. Definitions in economics</li> <li>5. Macro Economic Tools</li> <li>6. Economic systems</li> <li>7. Market economy</li> <li>8. Disadvantages of market economy</li> <li>9. Planned economy</li> <li>10. Mixed economic systems.</li> </ol> <ol style="list-style-type: none"> <li>2. Functions of an economic system- a) Aquaculture economies</li> </ol>	
<b>Unit B: Demand and Supply of Fish</b>	<b>20</b>
<p><b>Introduction</b></p> <ol style="list-style-type: none"> <li>a) Consumer Demand             <ol style="list-style-type: none"> <li>1. Demand Schedule</li> <li>2. Demand Curve</li> <li>3. Demand and quantity demanded</li> <li>4. Factors affecting the demand for fish and fish products</li> <li>5. Population size and distribution</li> <li>6. Consumer income and distribution</li> <li>7. Prices and availability of substitutes</li> <li>8. Consumer tastes and preferences</li> </ol> </li> <li>b) Elasticity of Demand             <ol style="list-style-type: none"> <li>1. Price elasticity of demand</li> <li>2. Calculation of own price elasticity of demand</li> <li>3. Determinants of Price elasticity</li> <li>4. Income elasticity</li> <li>5. Cross Price elasticity</li> <li>6. Elasticity, total and marginal revenue</li> <li>7. Producer supply</li> <li>8. Elasticity of supply</li> </ol> </li> </ol>	

- a) Price elasticity supply
- b) Calculating supply elasticity's.
- c) Price inelasticities
- d) Short and long run supply curves

#### 9. Competitive market equilibrium

<b>Unit C: Fish Marketing</b>	<b>15</b>
1. Introduction	
2. Traditional and modern fish marketing	
3. Fish trade on micro and macro levels	
4. Selling procedure for fish in India	
5. Cost marketing and differential prices	
6. Strategic fish marketing	
7. Intensive growth	
8. Diversification of growth	
<b>Total</b>	<b>45</b>

**B.Sc. III (Fishery Science)  
Semester V  
Paper XVI  
Modern trends in Fishery Science--I**

<b>Unit A: Principles of Fish Genetics and Biotechnology</b>	<b>30</b>
<ol style="list-style-type: none"> <li>1. Fish Genetic Gene Pool and Resources</li> <li>2. Chromosomes and Genes</li> <li>3. Karyotyping</li> <li>4. Cryopreservation of gametes (Gene banking)</li> <li>5. Sex determination</li> <li>6. Mass sex culture</li> <li>7. Sterile fish</li> </ol>	
<b>Unit B: Hybridization</b>	<b>20</b>
<ol style="list-style-type: none"> <li>1. Hybridization in Indian Carps</li> <li>2. Intra Specific and Interspecific hybrids</li> <li>3. Natural hybridization</li> <li>4. Important hybrids</li> <li>5. Inbreeding, cross breeding and selective breeding</li> <li>6. Application of hybridization in fisheries</li> </ol>	
<b>Unit C: Chromosomal engineering</b>	<b>15</b>
<ol style="list-style-type: none"> <li>1. Gonads</li> <li>2. Oogenensis</li> <li>3. Androgenesis</li> <li>4. Polyploidy (Triploids or Tetraploid fish)</li> <li>5. Production of meiosis suppressible and female by hormonal and sex reversal techniques.</li> </ol>	
<b>Total</b>	<b>45</b>

**B.Sc. III (Fishery Science)  
Semester V  
Paper VXI (Practical)**

1. Techniques of pond culture (fish culture, prawn culture),	03
2. Field level data collection, tabulation, analysis and Report writing (Inland fishery catch from nearby villages)	05
3. Study of organizational structure and their role in fisheries viz.	
4. Fishermen co-operative society	
5. Report writing – State fish organization.	
6. State and central Government organization i.e. ministry of fisheries.	
7. Visit to fish processing unit.	08
	-----
<b>Total</b>	<b>15×3</b>

**- 45**

**Study**

1. Organizational structure and their role in fisheries Govt. of Maharashtra.
2. Study of Techniques of fisherman co-operative society from nearby villages.

**B.Sc. III (Fishery Science)**  
**Semester V**  
**Paper XVIII (Practical)**

1. Collection and observation of gametes from fresh water fishes	02
2. Ploidy evaluation using cytotoxic measurements	04
3. Cryopreservation of gametes	03
4. Chloroquine karyotyping	03
5. Sex determination in fin-fishes and shell-fishes	05
6. Determination of eyeroids in major carps (Rohu - <i>Catla feryata</i> )	02
<b>Total</b>	<b>15/3</b>

**B.Sc. III (Fishery Science)**  
**Semester VI**  
**Paper 313**  
**(Fish statistics, Management and Extension)**

**Unit A: Statistics**

1. Definition and scope of statistics
2. Collection and organization of data
3. Representation of data by graphs, charts and diagrams
4. Classification of data according to attributes and class intervals
5. Construction of frequency tables and the criteria for choice of form of grouped table
6. Methods of summarizing mean, median and mode of grouped and ungrouped data

35

**Unit B: Management and Extension**

1. Nature of fisheries extension
2. Fisheries extension and traditional management
3. Extension and co-operative development
4. Role of co-operative development in fisheries
5. Fisheries extension system India, problems.
6. Phases of fisheries extension
7. Communication and flow of information.

13

**Unit C: 1. Techno socio-economic problems of fisheries**

2. Role of women in fisheries
3. Needs of technical knowledge to fishermen

65

Total

83

**B.Sc. III (Fishery Science)**  
**Semester VI**  
**Paper XX**  
**Modern Trends in Fishery Science – II**

<b>Unit A: Immunology of fishes</b>	
1. Introduction	
2. Methods of immunology	
3. Antibodies	
4. Immunoglobulins of fish	
5. Specificity of fish antibodies	
6. Blood groups in fishes	
7. Cellular basis of immunological response	10
<b>Unit B: Microbiology</b>	
1. Introduction to aquatic microbiology	
2. Distribution of microorganisms in environment.	
- Aquatic micro organisms in ponds and lakes	
- Aquatic microorganisms in sea	
3. Importance of aquatic microbes	
- Productivity of aquatic eco systems	
- Bio geochemical transformations	
4. Microbiology of sewage or waste water	15
<b>Unit C: Canning, preservation and spoilage of fish and other sea foods.</b>	
1. Canning	
2. Preservation.	
- Use of heat.	
- Use of low temperature.	
- Use of irradiation.	
- Preservation by drying.	
- Use of preservatives	
3. Spoilage.	
- Enzymatic spoilage.	
- Autolysis.	
- Chemical spoilage.	
- Rancidity.	
- Regrowth and post-mortem changes	
- Factors influencing kind and rate of spoilage.	
- Tolerances of spoilage.	
- Bacteria and causing spoilage.	
- Spoilage of special kind of fish and sea foods.	18



**Unit D: Application of remote sensing techniques for locating pelagic fish  
Concentration. 05**

**Total —  
45**

**B.Sc. III (Fishery Science)  
Semester VI  
Paper XXX (Practical)**

1. Study of socio-economic conditions of fishermen living near by Villages 05
  2. Preparation of extension material like pamphlets, leaflets and posters And wall posters 02
  3. Preparation of Radio talks and Television
  4. Participation in Exhibitions. 01
  5. Interview of fish farmers
- A detailed project of the above cited areas should be submitted at the time of examination

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1581

**Total — 43**

**B.Sc. III (Fishery Science)**  
**Semester VI**  
**Paper XVII (Practical)**

1. Microbial analysis of fish K-Coli Enterics And identification of Salmonella and V-Clotax	05
2. Determination of blood groups in fishes	03
3. Fish parasitology	03
4. Total plate count Fish/egg	
5. Methods of preservation salting, sundry (Any locally available fish/egg).	.....
<b>Total</b>	<b>15×5</b>
	<b>-45</b>

**List of books recommended for paper XVII and XXI**

1. Curtis, M.J. and Howard, A.C. (1997) *Essentials of Aquaculture*. Food products press, New York.
2. Rao, P.S. (1999) *Fishery economics and management in India*. Pioneer publishers and distributors D/9, Vanshree opposite Durga and Tatties LT road, Borivali (West), Bombay - 400 092.
3. Mahesh V. Joshi (1996) *Economics of fisheries* A. B. T. Publishing corporation, 5-Accari Road, Darya Gacj, New Delhi.
4. P.N. Arora and P.K. Malhotra (2002) *BioStatistics*. Himalaya Publishing House.
5. Rama Krishna, P. (1995) *BioStatistics*, Saras publication A.S.P. Mangal Road, Perinivilai, Kottar, po. Nagercoil, Kanyakumari Dist. Pin - 625 009.
6. Panigrahy P.K. (2006) *Introduction to Biostatistics* S. Chaud and Company Ltd. Ram Nagar, New Delhi - 110 055.
7. Norman T.J. Bailey (2004) *Statistical methods in biology* (Third Edition) Cambridge University press (Low price editions).
8. Dr. Mangulkar A.N. (1997) *An introduction to Biometry*, Saraswati publication, Aurangabad.
9. Anand P.N. (2000). *Marine Fisheries extension* Discovery publishing house, New Delhi - 110 003.
10. *A Manual in Fishery science* A.D. Mohlekar, S.M. Karakur and D.N. Chintz.

#### List of books recommended for paper XVII and XXI

1. Beaman, A.R.: Biotechnology and Genetics in fisheries and Aquaculture, Naranda publishing House – Delhi – 110 006
2. Dr. Banga M.M. and Dr. (Ms) Shama (J.J. (2005): Fish Biotechnology, published by Agropolis (India) Agrohouse, Behind Naraini Cinema, Chojasari Road, Delhi. – 110 002
3. Shrivastava C.B.L. (2005). A Text book of fishery science and Indian Fisheries. Kishu Bahari; 28, Nandhi Sukhla's Road, New Delhi – 110 003
4. Das, P. and Jajanan, A.G. (1976): Fish Genetics in India. Today and Tomorrow publishers, New Delhi
5. Laker, W.S. (2003): Fish Genetics and Biotechnology C. P. K. Murari.
6. Kemping Sagar and Reilly (1999): Aquaculture and Biotechnology Oxford and UBC press, Co.Ltd. New Delhi.
7. Mani, A. and Selvaraj and others (1993): Microbiology (General and applied) Sarsa publication.
8. Frazier W.C. and Westhoff D.C. (1986): Food Microbiology (Hindi Edition) Tata Mc Graw-Hill pub.co.Ltd. New Delhi.
9. Douglas P.A. Anderson. Fish Immunology, Naranda publishing House- Delhi- 110 006.
10. George Iwama and Teruyuki Nairanishi: The fish immune System. Academic press.
11. Large marine ecosystems. Exploration and Exploitation for sustainable development and conservation of fish stocks (1994) Paerology of S; agerup. Edited by Dr. V.S. Somvaran and published by ISI, Barnawa Chambers, No. P.M. Road, Mumbai – 400 031.

S-30th May, 2015 AC after Circulars from Circular No.1 &amp; onwards++ - 32 -

**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY****CIRCULAR NO.SU/Sci./B.Sc. Syll./31/2015**

It is hereby notified for information to all the concerned that, on the recommendation of the various Board of Studies, Ad-hoc Boards & Committees the Hon'ble Vice-Chancellor has accepted the **revised semester-wise syllabi in the Faculty of Science as under** on behalf of the Academic Council under Section-14[7] of the Maharashtra Universities Act, 1994 :-

Sr. No.	Name of the Subject	Semester
[1]	B.Sc. Automobile Technology IInd Year, [Three Year Degree Course].	III & IV
[2]	B.Sc. Horticulture IInd Year, [Optional].	III & IV
[3]	B.Sc. Chemistry IIIrd Year, [Optional].	V & VI
[4]	B.Sc. Analytical Chemistry IIIrd Year, [Optional].	V & VI
[5]	B.Sc. Agrochemical & Fertilizer IIIrd Year, [Optional].	V & VI
[6]	B.Sc. Geology IIIrd Year, [Optional].	V & VI
[7]	B.Voc. Multimedia & Animation, [Three Year Degree Course].	I to IV
[8]	B.Voc. [1] Industrial Automation, [2] Automobile & [3] Travel & Tourism, [Three Year Degree Course].	I to VI
[9]	B.Voc. Jewellery Design & Gemology, IInd Year [Three Year Degree Course].	III & IV
[10]	Diploma in Industrial Automation for Community College at University Campus.	

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./  
2015/6860-7259  
Date:- 08-07-2015.

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**Director,**  
**Board of College and**  
**University Development.**

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

- 33 -

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
- 1] The Director, C.V.E.T., Dr. Babasaheb Ambedkar Marathwada University Campus, Aurangabad.
- 2] 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, [B.C.S. Unit],
  - 5] The Programmer [Computer Unit-1] Examinations,
  - 6] The Programmer [Computer Unit-2] Examinations,
  - 7] The Record Keeper.
- Dr. Babasaheb Ambedkar Marathwada University.

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**Dr. Babasaheb Ambedkar Marathwada University,  
Aurangabad.**

**SYLLABUS OF  
B.Sc. Third Year  
(Geology)  
Semester V & VI**

**[ Effective from June – 2015 2016 & Onwards ]**



## Dr. Babasaheb Ambedkar Marathwada University

### B. Sc. III Year Geology, Semester Vth & VIth

#### Course Structure

Year	Semester	Paper No.	Title	Hours	Marks
IIIrd	Vth	Paper - XVII	Indian Geology	45	50
		Paper - XVIII	Economic Geology	45	50
		Paper - XXI	Practical - Economic Geology	45	50
		Paper - XXII	Practical -Stratigraphy of Structural Geology	45	50
	VIth	Paper - XIX	Applied Geology – I	45	50
		Paper - XX	Applied Geology – II	45	50
		Paper - XXIII	Practical- Remote Sensing and Engineering Geology	45	50
		Paper - XXIV	Practical - Hydrogeology	45	50



34.S-[F]NPW-02 June-2015-16 All Syllabus Science B.Sc. Geology IIIrd Yr. Sem.V &amp; VI - 5 -

**Dr. Babasaheb Ambedkar Marathwada University****B. Sc. III Year Geology, Semester Vth & VIth****Course Structure**

Year	Semester	Paper No.	Title	Hours	Marks
IIIrd	VII.	Paper - XVII	Inorganic Chemistry	45	50
		Paper - XVIII	Economic Geology	45	50
		Paper - XIX	Practical - Economic Geology	45	50
		Paper - XXII	Practical - Stratigraphy of Structural Geology	45	50
		Paper - XXV	Applied Geology - I	45	50
VIth	VIII	Paper - XX	Applied Geology - II	45	50
		Paper - XXIII	Practical - Remote Sensing and Engineering Geology	45	50
		Paper - XXIV	Practical - Hydrogeology	45	50



Dr. Balasaheb Ambedkar Marathwada University

**Dr. Balasaheb Ambedkar Marathwada University**  
**Aurangabad**

**B.Sc. – III Year Geology**

**Semester V**

**Paper 37111 Economic Geology**

Sr. No.	Syllabus	No. of Marks
1	Mechanics of magmatic fluids	10
2	Processes of formation of mineral deposits	
	a) Magmatic concentration	
	b) Metasomatic and Metasomorphism	
	c) Hydrothermal Processes	
	d) Early Tertiary deposits	25
	e) Replacement deposits	
	f) Concentration and Storage of Salts in enrichment of Sediments	
	g) Structural, Regional concentration	
	h) Economic mineral resources	10
	i) Gravity: geophysical distribution of floating mass of deposits	
	j) Gravity: chemical composition, Lead, Zinc, Gold, Boron, Copper, Uranium deposits etc.	10
	k) Occurrence, formation and distribution of carbonates and sulphates and sulphate	
	l) <u>Problems with problems questions</u>	
		45

B.Sc. Geology IIIrd Year Syllabus 2015-16

10

## Semester VI

Paper VI

Applied Geology – I

Sl. No.	Syllabus	No. of Marks
1	Introduction to various types of <u>Geological</u> structures expressed in the present day <u>Case study</u> from <u>any</u> of the <u>quaternary</u>	20
2	Geo-chemical and <u>Geo-physical</u> method of <u>exploration</u> of <u>hydrocarbon</u> resources Geological methods of <u>prospecting</u> (a) Gravity method (b) Magnetic method (c) Seismic reflection method, seismic refraction method (d) Electrical resistivity methods (e) Radiometric method and	
3	Introduction to <u>theory</u> of <u>zoning</u> <u>Geo-chemical</u> zoning as <u>employed</u> to <u>classify</u> <u>igneous</u>	10
4	<u>Mineralogy</u> and <u>classification</u> of <u>minerals</u>	10
5	Importance of <u>geological</u> <u>survey</u> in <u>the</u> <u>environment</u>	10
6	Application of <u>Geology</u> in the <u>construction</u> of <u>major</u> <u>engineering</u> <u>structures</u>	10
7	History of <u>uses</u> of <u>minerals</u> for <u>social</u> <u>development</u> <u>in</u> <u>India</u> and <u>abroad</u> <u>of</u> <u>minerals</u> <u>such</u> <u>as</u> (a) <u>Iron</u> <u>ore</u> , <u>coal</u> , <u>graphite</u> <u>and</u> <u>mica</u>	10
8	The <u>uses</u> of <u>minerals</u> in the <u>development</u> of <u>social</u> <u>structure</u> in <u>India</u> <u>and</u> <u>abroad</u>	10
9	The <u>uses</u> of <u>minerals</u> in the <u>development</u> of <u>social</u> <u>structure</u> in <u>India</u> <u>and</u> <u>abroad</u>	10
10	Methods of <u>filling</u> and <u>rehabilitation</u> of <u>open</u> <u>cast</u> <u>mines</u> <u>efficiently</u>	10
	Total	100

• UPE 6211 (Geology) 2015-16, A, B, C & D Semesters

## Semester Vt

Paper XX

### Applied Geology - II

Sr. No.	Syllabus	Total Marks
1	Introduction to Soil, weather, Hydrology, Hydrogeology and Geology	4
2	Theory and practical of tests: Porosity, Permeability, Seepage, Specific yield, Specific storage, Storage coefficient	10
3	Aquifers and their classification	4
4	Measurement of Ground Water, Darcy's law	8
5	Well - types and purposes in - Ground water level and hydraulic head, flow	16
6	Characteristics of different types of aquifers and their hydrogeology	16
7	Concept of sustainable Management, and conservation strategies of water resources in urban, industrial and hydrogeology in watershed development	16
8	Hydrogeological characteristics of aquifers and availability of ground water in different types of rocks	8
9	Hydrogeology in different types of rocks	8
	<b>Total</b>	<b>80</b>

**Syllabus for the B.Sc. Geology IIIrd Year Sem. V & VI**

21

**Semester VI**

**Part XXI (Practical) Economic Geology**

Sl. No.	Syllabus	No. of Lectures
A	Identification of various minerals in thin sections of the following rocks: Magnetite, Hematite, Pyrite, Limonite, Malachite, Azurite, Pyrochlore, Bismutite, Barite, Fluorite, Calcite, Dolomite, Gypsum, Cassiterite, Pyrolusite, Manganese, Sphalerite, Galena, Sylvanite, Borax, Selenium, Uradite, Wadsworthite, Kaolinite, Opuntite, Beryl, Kyanite, Gypsum, Halite, Tourmaline, Arsenopyrite and Selenopyrite. <b>Stems *</b>	8
B	Identification of various minerals in thin sections of the following rocks: <b>Stems *</b>	3
C	Identification of various minerals in thin sections of the following rocks: <b>Stems *</b>	2
<b>Total</b>		<b>13</b>

**Part XXII (Practical) Stratigraphy or Structural Geology**

Sl. No.	Syllabus	No. of Lectures
A	Description of various stratigraphic units in the regional area. <b>Stems *</b>	10
B	Description of various types of unconformities. <b>Stems *</b>	10
C	Description of parallelism beds in the regional area. <b>Stems *</b>	3
<b>Total</b>		<b>23</b>

**Paper VIII – Geology and Engineering Geology**

15

**Paper XAII – Practical – Remote Sensing and Engineering Geology**

Sr. No.	Syllabus	No. of Marks
A	Study of satellite images for delineation of geomorphological features and lineaments	10
B	Study of aerial photographs for detection of various geomorphological features and their interpretation	05
C	Mapping of certain natural and engineering cracks like lands, and, lineaments on the geological map showing some of standard features and location of such sites	05
Total		15

**Paper XAIV – Practical – Hydrogeology**

Sr. No.	Syllabus	No. of Marks
A	Groundwater potentiality by using various techniques	2
B	Hydrogeology of problems (Case studies)	3
C	Well installation, survey, and progression of hydrogeological logs, lithology, and distribution of aquifers	3
D	Chemical analysis of water sample	2
Total		10

**2. Objective 1 to 10th Sem. (2015-16) - 1 to 10 Sem. (2015-16)**

**List of Books**

Sl. No.	Title	Author
1	Principles of geology	Turner
2	Textbook of Geology	Billings
3	Textbook of Mineralogy	Dana
4	Elementary Geology of Karnataka	Chitambar
5	Essentials of Geology	Debnath
6	Geological atlas of Karnataka	Chitambar
7	Geology of India	Wadia
8	Engineering and Geological Geology	Pathan
9	Textbook of Mineralogy	Turner and Verwey
10	Mineralogy - Petrology & Economic Geology	ISM
11	Ground water Hydrology	Tejpal
12	A Geology of Karnataka	Chitambar
13	Geological Map of Karnataka	Chitambar
14	Geology of Karnataka	Chitambar
15	Textbook of Engineering Geology	R. S. Gupta
16	Mineralogy & Economic Petrology	Strom
17	Geology of Karnataka	Chitambar
18	Geology of Karnataka	Chitambar
19	Textbook of Mineralogy, Petrology and Geology	Chitambar
20	Mineralogy	Prasad
21	Textbook of Mineralogy	Turner
22	Textbook of Mineralogy & Petrology	Pathan & Sankar
23	Geology of Karnataka	Chitambar
24	Geology of Karnataka	Chitambar



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

25-50th May, 2018. SAC's No. Circulars Date Circular No.1 & onwards - 7 -

2

**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, [B Survidha Kendra], in-charge 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.

2018-2000015/-

**DR. BABASAHEE AMBEDKAR  
MARATHWADA UNIVERSITY,  
AURANGABAD.**



Revised Syllabus of

B.Sc. [Industrial Chemistry]

(*Optional*)  
Semester - V & VI

( Effective from 2015-16 & onwards )

*Handwritten signature*

Dr. Bhanubhai Ambedkar Marathwada University, Aurangabad

Revised Syllabus of B.Sc. V & VI Semester Industrial Chemistry  
(Effective from the Academic Year 2015-2016)  
i.e. Since June 2015 & onwards.

**B.Sc. Industrial Chemistry**  
Three Year Degree Course (Semester Pattern) Year 2015-2016

Year	Page	Course Name	Hours	Marks
B.Sc. Semester V	XIII	Unit Processes in Organic	45	50
B.Sc. Semester V	XIV	Process Equipment Design	45	50
B.Sc. Semester V	XV	Practicals	120	100
B.Sc. Semester VI	XVI	Unit Processes in Inorganic Synthesis & Industrial Safety	45	50
B.Sc. Semester VI	XVII	Process Instrumentation & Plant Utilities	45	50
B.Sc. Semester VI	XVIII	Design Thesis	120	100

## **B.Sc. Semester V- Industrial Chemistry**

### **Paper XIII - Unit Processes in Organic Synthesis**

**Marks :50      Hours : 45**

#### **Unit Processes in Organic synthesis :**

##### **1. Nitration:**

Introduction, Nitrating Agents, Aromatic Nitration, Kinetics & Mechanism of Aromatic Nitration, Nitration of Paraffinic hydrocarbons, Nitrate Esters, N-Amino Compounds, Process equipment for Toluene Nitration, Amine Nitration, Continuous Nitration, Mixed-acid compositions, DVB as inhibitor, Typical Industrial Nitration Process: Preparation of Nitrobenzene, Preparation of m-dinitrobenzene

##### **2. Amination by Reduction:**

Introduction & Definitions, Methods of Reduction, Iron & Acid (Hessing) Reduction-Reaction Mechanism, Chemical & Physical factors, Physical Equilibrium, Amount of reagents used, Amount of Acid used, Effect of Agitation, Reaction Temperature, Addition of Solvents, Yields of Amino, Equipment Materials of Construction, Agitation, Jacketing of Reducers, Manufacturing of Aniline & Recovery of Aniline, Distillation of Aniline

##### **3. Nitrosation:**

Introduction, Chlorination, Hydrochlorination, Isomerization.

##### **4. Sulfonation & Sulfidation:**

Introduction, Sulfonating & Sulfiding agents, Sulfonation of Aromatic compounds, Benzene & its derivatives, Naphthalene & its derivatives, Sulfonation of its derivatives.

##### **5. Polymerization:**

Introduction, Functionality, Polymerization Reactions, Polycondensation, Addition Polymerization, Free radical polymerization, Ionic Polymerization, Bulk Polymerization, Solution Polymerization, Emulsion Polymerization, Suspension Polymerization.

#### **Reference Books:**

1. Unit Processes in Organic Synthesis - P.H.Groggins
2. Chemical Process - Shreve
3. Industrial Chemistry - R.K.Saxena
4. Organic Chemistry- Chavalkar
5. Polymer Chemistry- Billmeyer

**B.Sc. Semester V - Industrial chemistry**  
**Paper- XV Practical on Organic Synthesis Marks: 100**  
**Time: 3 Hours**

**List of Experiments**

**Experiments on Unit Processes**

1. Preparation of *p*-nitroacetanilide from acetanilide & Calculate % Yield
2. Preparation of *m*-dinitrobenzene from nitrobenzene & Calculate % Yield.
3. Preparation of *o*-nitrophenol (picric acid) from Phenol & Calculate % Yield.
4. Preparation of *p*-nitroaniline from *p*-nitroacetanilide & Calculate % Yield
5. Preparation of *m*-nitroaniline from aniline & Calculate % Yield.
6. Preparation of *p*-nitroaniline from Acetanilide & Calculate % Yield.
7. Preparation of 2-Bromophenyl Urea from 2-bromocyclohexanone & Calculate % Yield.
8. Preparation of 4-Bromoacetanilide from Acetanilide & Calculate % Yield
9. Preparation of 2-bromoaniline from *p*-bromoacetanilide & Calculate % Yield.
10. Preparation of 2,4,6-tribromoaniline from Aniline & Calculate % Yield.
11. Preparation of *o*-chloroacetanilide from aniline acid & Calculate % Yield.
12. Preparation of Sulphanilic acid from aniline & Calculate % Yield
13. Preparation of Polystyrene by Bulk suspension emulsion Polymerization method & Calculate % Yield
14. Preparation of 6.6 and 6.0 thread by condensation & Calculate % Yield
15. Preparation of Novolac & Resole – II (crosslinking resin) & Calculate % Yield
16. Preparation of Urea form dye from urea & Calculate % Yield
17. Preparation of Polyacrylonitrile (Orlon) & Calculate % Yield

**Ref Book**

Vogel's Textbook of Practical Organic Chemistry-Third Edition  
Arunachalam, Organic Chemistry-Vol.1

## **B.Sc. Semester V- Industrial Chemistry**

Paper XIV - Process Equipment Design

Marks :50 Hours : 45

### **Process Equipment Design**

#### **1. Distillation & Fractionating Equipment:**

Introduction, Types of Column, Stresses in the column Shell, Determination of Shell thickness, Determination height "DC", Allowable deflection, Column Internal details, Equilibrium stage column, Differential Column.

#### **2. Evaporation- Introduction, types of evaporators-Equipments**

#### **3. Crystallization- Introduction, types of crystallization Equipments**

#### **4. Centrifugation- Introduction, types of Centrifugation -Equipments**

#### **5. Agitators**

Types of Agitators, Baffles,

#### **6. Reaction Vessels:**

Introduction, Materials of Construction, Classification of Reaction Vessels, Heating Systems, Design Considerations.

#### **7. Corrosion:**

Factors of Corrosion, Factors of safety, corrosion, Factors avoiding corrosion.

#### **Reference Books:**

1. Process Equipment Design M.V Joshi
2. Process Equipment Design: Mahajani & Joshi
3. Perry's Handbook of Engineering Chemistry

## B.Sc. Semester VI- Industrial Chemistry

### Paper XVI - Unit Processes in Inorganic Synthesis & Industrial Safety

Marks :50 Hours : 45

#### Unit Processes in Inorganic synthesis:

1. Industrial Process of Sulfur & Sulfuric acid
2. Nitrogen Industries: Ammonia, Nitric acid & Urea
3. Polymer Manufacturing Process:

1. Polyethylene & Polypropylene
2. Polyvinyl Chloride
3. Phenol Formicdehyde
4. Epoxy Resins
5. Benzoinone-Styrene Copolymer

#### Industrial Safety:

1. **Injury/Incident**- Definition & terms used in context of safety, Accident Non-reportable & reportable accidents, Hazard- Risk, Acceptance of risk, Responsibilities, Perception of Danger, Job Knowledge, Physical factors for Accidents- Accident analysis, Safety Training- Worker Training, Role of Supervisor in setting a high standard of Safety, Supervisory Training, Motivation for Safety Safety Suggestion Scheme, Safety Committee, Safety Competition- Safety Clubbing, Safety Union, Safety Publications & Material
2. **Fire & Explosion**- The Chemistry of Fire, Fire triangle, Classification of Fire, Stages of Fire, Causes of Industrial Fire Electrical Equipment Shorting, Mechanical Fault, Welding & Gas Cutting, Sparks, Explosives Dusts, Static spark, Runaway Chemical reaction, Fire Detection Flammability Observation, Fire Alarm System, Fire Extinguishers- fixed Fire fighting systems, Portable fire Extinguishers- Soda acid type, Dry Chemical Powder type, Carbon dioxide type & Foam type Extinguisher.
3. **Personal Protective Equipment**- Head Protection, Foot Protection, Hand Protection, Eye Protection, Ear Protection, Skin & Body Protection, Protection against Fall, Noise Protection, Respiratory Protection-Care & Precaution, External air supply type & Self-Contained Breathing apparatus (SCBA), Selection of Personal protective equipment

#### Reference Books

1. Heyden's Outline of Chemical Technology- 4<sup>th</sup> edition
2. Introduction to Industrial Safety-K.L. Kulkarni (2002) Or Concepts & Practices in Industrial Safety- K.T.Kulkarni (2007)
3. Handbook of Fire Technology- Gupta R.S. Orient Longman Publication (1999)
4. Hazards in Chemical Industry- Paulya P.L. (Oxford 1984-1997)



## **B.Sc. Semester VI- Industrial Chemistry**

**Paper XVII - Process Instrumentation & Plant Utilities**

**Marks : 50 Hours : 45**

### **Process Instrumentation**

#### **Temperature Measurement**

1. Filled-Bell & Glass-Stem Thermometers.
  - a) Glass-Stem Thermometers
  - b) Filled Thermal Systems
  - c) Liquid Filled System
  - d) Vapor System
  - e) Gas-Filled System
2. Bimetallic Thermometers
3. Resistance Temperature Detector (RTD's)
4. Radiation & Pyrometers

#### **Pressure Measurement**

1. Manometers-U-tube, Well, Inclined & Micromanometers.
2. Bourdon & Helical pressure Sensors:
  - Coupled Bourdon Pressure Sensors
  - Spiral Bourdon Pressure Sensors
  - Helical Bourdon Pressure Sensors
3. Diaphragm type Pressure Sensors
4. Piezo Electric type Pressure Sensors
  - Yerres Balance absolute Pressure
5. Diaphragm or Capsule type sensors
6. Pressure Gauges

#### **Plant Utilities**

1. Water-Sources of Water: Hard & Soft water, Causes of Hardness, Disadvantages of hard water, Methods of softening of water, Preheating of water-Lime soda Process Ion Exchange process, Isoelectric characteristics of hardening water, purification of water-Sedimentation, Coagulation, Filtration, Treatment to Boiler Feed Water-Formation of Scale, Corrosion, Pitting & Fouling, Caustic embrittlement.
2. Insulation-Introduction, Insulating Factors, properties of good insulator, Classification Glass Wool Properties & application, Fiberglass Properties & application, Cold insulation, Low Temperature Insulation.
3. Steam & Steam Generator- Steam-Formation of Steam at constant Pressure, Enthalpy- Enthalpy of water, Enthalpy of Evaporation, Enthalpy of dry saturated steam, Wet Steam, Superheated Steam, Specific Volume of steam, Steam Generator- Class Question, Factors for Boiler selection.
4. Air- Compressed air, Fan air, Regenerative Air Compressors, Multistage Compressors, Rotary Compressors.

#### **Reference books:**

1. Process Instrumentation (Kirk & Rembo)

2. Process Measurement & Analysis (Instrument Engineers' Handbook);  
Third Edn. : Butterworths (Business Publications) – Delhi (3) – Lipik
3. Plant Utilities: D.B.Misra (Nirali Prakashan) D.D.Dekur

### **B.Sc. Semester VI- Industrial Chemistry**

**Paper XVII - Design Thesis**

**Marks :100      Hours : 120**

- |   |          |
|---|----------|
| 1. Submission of Design Thesis on technical Product   | 40 Marks |
| 2. Writing of Synopsis on Thesis<br>Write brief information about History, Physical & Chemical Properties, raw materials, methods of production, Manufacturing process description, Flow sheet, Material balance & Uses | 20       |
| 3. Industrial Visit & Submission of visit report  | 20       |
| 4. Viva-voce  | 20       |

S-30th May, 2015 AC after Circulars from Circular No.1 &amp; onwards - 6 -

**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY****CIRCULAR NO.ACAD/SU/Sci./B.Sc. & M.Sc. Syll./5/2015**

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as under :-

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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.**

23-50th May, 20: 5:00:00 for Circulation Date Circular No.1 & onwards - 7 -

2

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- 1] The Principals, affiliated concerned colleges,  
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**Copy to :-**

- 1] The Controller of Examinations,
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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.

2023-2024/5/2-

**Revised Syllabus of B.Sc. Third Year  
[Microbiology]  
Semester- V & VI**

*(Optional)*

**(Effective from June 2015 – 2016 onwards)**

*Dr. P. Srinivasan  
Director  
University of Madras  
17/1/2015*

## DR BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

## Course Structure

Year	Semester	Paper number	Paper Title	Hours	Marks
B. Sc IIIrd	V	Paper-XXV	Microbial Genetics	45	50
		Paper-XXVI	Microbial Metabolism	45	50
		Paper-XXVII	Practical	45	50
		Paper-XXVIII	Practical	45	50
		Paper-XXIX	Recombinant DNA Technology	45	50
	VI	Paper-XXX	Industrial Microbiology	45	50
		Paper-XXXI	Project	45	50
		Paper-XXXII	Practical	45	50
	Total				350

**B.Sc. III<sup>rd</sup> Year, Microbiology**

**[Semester-V]**

**Paper XV- Microbial Genetics**

**Unit I : Properties of DNA and Gene expression (12)**

- Molecular structure of DNA
- DNA as a genetic material - Experimental proof -
  - i. Griffith and Avery, MacLeod and McCarty experiment
  - ii. Hershey Chase and experiments.
- Molecular properties of DNA – Melting, Breachline, Bending, flexibility, Novel structures, linking number, major and minor groove.

**DNA Replication**

- Semi conservative mode of DNA replication; Meselson and Stahl's experiment
- Mechanism, steps and process with enzymes involved in replication
- Post replication modification- Methylation (dam, dcm, hsd)

**Unit II (16)**

**Gene expression**

- Molecular basis of Genetic code
- Biological significance of a gene: Protein synthesis - Transcription and Translational processes.
- Regulation of gene expression: Lac operon , Ara operon

**Unit III: Genetic Mutations (11)**

- Spontaneous mutation: Definition, causes, reversion plating.
- Induced mutation: Types
  - Base pair substitution (Transition and Transversion)
  - Frameshift mutations (deletion and insertion)



- Mutagens: mutagens, non-mutagenic mutagens, silent mutagens.
- Genetic suppression- Intra-genic and inter-genic
- Mutagenesis by physical and chemical agents  
Physical mutagenic agents: U.V. radiations, X-rays  
Chemical mutagens: Base modifiers: Nitrous oxide, Base analogues: 5-Bromo uracil.  
Agents producing distortion in DNA – Polya-om, Intercalating agents- ethidium  
monale.

**Unit IV: Bacterial Recombination**

(11)

- Transformation: Definition, experimental proof, process of transformation, uptake of DNA, competence factor
- Transduction: Definition, Lederberg and Zinder E. coli experiment, Mechanism and process- generalized specialized and restrictive transduction.
- Conjugation = (cell-to-cell) Experimental work Lederberg andatum experiment, Conjugation process,
- F, Hfr, F' factors.

[Semester - V]

Paper-XXVI: Microbial Metabolism

Unit 1

(1E)

- Enzymes: Definition, properties, specificity, active site, activation of enzymes, Mechanism of action of enzymes, lock and key, induced fit, ping-pong
- Nomenclature and classification of enzymes
- Factors affecting catalytic activity of enzymes (pH, temperature, enzyme concentration, substrate concentration, metal ions, heat)
- Michaelis-Menten equation: derivation and significance.
- Types of enzymes: extracellular, intracellular, constitutive and inducible.

Unit II

(1H)

- Enzyme inhibition: Irreversible, reversible (competitive, noncompetitive, allosteric) and metabolic antagonism, feedback inhibition.
- Co-enzymes and co-factors: NAD, FAD, Lipolic acid, Vitamin B12, Thiamine pyrophosphate
- Elementary knowledge and uses of biotechnology
- Commercial uses of enzymes (e.g. dye, food, leather, textiles, vitamins, pharmaceuticals and clinical)

Unit III

(1H)

- Definitions: Metabolism, anabolism, catabolism, free energy.
- Bioenergetics, chemical links between catabolism and biosynthesis, energy coupling through ATP and through pyridine nucleotides, Central role of ATP-ADP system.
- Modes of energy yielding metabolism: Definition and features of fermentation, Respiration and photosynthesis.
- Fermentation of carbohydrates:

- EMP, HMP, ED, Phosphoketolase pathway (pentose + hexose) with structure.
- Alcoholics, lactic, mixed acid, butyric, butyric, acetone butanol fermentations.

#### Unit IV

(12)

- Aerobic respiration:
- ETC : Coenzyme Q, cytochromes, redox carriers, oxidative phosphorylation artificial electron receptors, bacterial cytochrome systems
- TCA cycle, glyoxylate cycle, anaplerotic reactions
- Catabolism of saturated (16 carbon) and unsaturated fatty acids (16 carbon) by  $\beta$  oxidation
- Degradation of proteins and amino acids: proteolysis, autolysis.
- Transformation of amino acids: oxidation, reduction, decarboxylation, deamination (one example of each).
- Nucleic acid catabolism: DNA, RNA depolymerization, degradation of nitrogenous bases (mention end products without pathway)
- Biosynthesis of nucleotides: Purine and pyrimidine nucleotides, conversion of ribonucleotides to deoxyribonucleotides

**B.Sc. III<sup>rd</sup> year, Microbiology [Semester-V]**

**Practical paper - XVII**

1. Isolation of total RNA from yeast.
  - i) Purification of RNA by phenol extraction method.
  - ii) Concentration of RNA by ethanol precipitation.
2. Hyperchromicity study of chromosomal DNA using UV- visible spectrophoto meter.
3. Isolation of penicillinase Lac mutant of *E. coli* by Replica plating.
4. Effect of U.V. radiation (U.V. damage) on DNA and gene re-activation in *S. cerevisiae*.
5. Study of transformation in *E. coli*
  - a. Preparation of competent *E. coli*
  - b. Enumeration of transformed cells
  - c. Determination of plasmid transfer efficiency
6. Isolation of coliphage  $\phi$  from sewage.
7. Study of conjugation in *E. coli* (Plate method)

**Practical paper -XVIII**

1. Preparation of bulges and resazurin.
2. Study of enzymes - amylase, caseinase, cellulase, deulfinase, gelatinase, lipolifinase, cellulase.
3. Effect of pH, temp, substrate concentration on enzyme activity.
4. Demonstration of nitrate reduction.
5. Demonstration of decarboxylation of amino acid.
6. Isolation of photosynthetic bacteria by culture method.
7. Primary screening for:
  - i) Starch hydrolyzers.
  - ii) Organic acid producers
  - iii) Antibiotic producers.

**Role of Unit (Semester-VI)**

**Paper- XLX: Recombinant DNA Technology**

**Unit I:**

**(11)**

- Recombinant DNA technology: definition, constituents of genetic engineering, tools used for cloning, steps in gene cloning.
- DNA manipulating enzymes: i) restriction endonucleases (types, nomenclature, recognition sequences, cleavage patterns with examples), ii) DNA ligase iii) alkaline phosphatase, iv) polynucleotide kinase v) reverse transcriptase

**Unit II:**

**(11)**

- Vectors: properties of good vector, cloning and expression vectors, (pBR322, pUC18), Bacteriophage vectors (improved  $\lambda$  vector), cosmids, YAC.
- Properties of good host (cloning organisms).
- Uptake of DNA (Calcium chloride treatment, electroporation, protoplast fusion, liposomes)
- Selection of recombinant clones by blue white (opt) screening.

**Unit III:**

**(11)**

- Genomic library (construction and identification of desired clones)
- Probes (preparation & labeling), its uses.
- PCR
- Nucleic acid and protein blotting techniques :
  - o Southern blotting,
  - o Western blotting,
  - o Northern blotting.
- Colony hybridization
- DNA sequencing (Sanger method / dideoxy method)

**Unit IV**

(12)

- Gene therapy (Sickle cell and SCID)
- Applications of genetic engineering
  - o Agriculture (Golden rice and Bt cotton)
  - o Human and animal health (Interferon and HBV vaccine)
  - o Industries (Strain improvement and recombinant proteins Insulin)
  - o Environment (Bioremediation and Bioremediation using GEMs)
- Ethical issues of genetic engineering.

**Semester VI Paper: XX Industrial Microbiology**

- Unit I :** (11)
- Introduction to Industrial Microbiology. Historical events (any two).
  - Lay out of a fermentation industry: Different units and departments and functions (stock, production and fermentation, I.Q.C and I.Q.A. and R & D). Packaging importance of sterility maintenance and checkers.
  - I.P. and W.H.O. standards of sterility.
  - Design of fermenters, Types, (Single, multiple)
  - Scale up of fermentation.
- Unit II :** (11)
- Primary and Secondary recovery methods
  - Preservation of industrially important microbes (Bacterial spores, overlying, mineral oil, soil stocks, lyophilisation, liquid nitrogen preservation)
  - Strain improvement, methods for increase in yield of product. (any one)
  - Development of inoculum (Steps)
  - Development of fermentation medium (Raw materials, nutrients, media formulation, pre-ferment, sterilisation, baffles, antifoam agents, cell lyses, practices)
  - Physiological adaptation and control
- Unit III:**
- Industrial fermentations (11)
    - o Antibiotic - penicillin
    - o Vitamin B12
    - o L-Lysine (Direct method)
- Unit IV** (12)
- Microbial production of
    - o Ethyl Alcohol
    - o Citric acid

### Reference Books for B.Sc III rd Year Microbiology

1. Arivuch & Kakali Upadhyay: MOLE BIO . Himalaya Publications.
2. Boyl J.M. & Boyl J.M. Molecular Biology
3. Pfeifferläer David : Microbial Genetics, Jones & Bartlett, Publications
4. Garavito Eldon , Simons Michael & Senastat Owen: Principles of Genetics, John Wiley & Sons, NEWYORK.
5. Jenner D.Watson : Molecular Biology of the gene, W.A. Benjamin, inc.
6. Vikram Rajwade & H. Mithaswari: Genetics & Microbiology : applications of Microbiology, ADI Publishing Co. NEW DELHI.
7. A.H. Rose : Clinical Microbiology-An introduction to microbial physiology, Butterworth World student, LONDON.
8. Campbell Peter N.& Staird Anthony D : Biochemistry Illustrated, Churchill Livingstone, NEWYARK.
9. Deb A.C. Fundamentals of Biochemistry, New central Book Agency, Calcutta.
10. Lehninger Albert L.: Principles of Biochemistry, CBS Publisher, NEW DELHI.
11. Lehninger Albert L: Biochemistry . Kalyani Publisher NEW DELHI.
12. Meer Albert G. & Foster John W. Microbial Physiology, John Wiley & Sons, Inc.
13. Meen A. G. Microbial Biochemistry.
14. Swinger R.F.: Life Chemistry- An Introduction to Biochemistry, Ovan Nostrand co. inc. LONDON.
15. Stryer Lubert Biochemistry. W.H. Freeman & Co. San Francisco.
16. U.Khater: Understanding enzymes.
17. Walker J.M. & Gingold A.D.: Molecular Biology & Biotechnology, Pitman Publications NEW DELHI.
18. King D.D. : Fundamentals of genetics and evolution. DELHI.
19. Joshi P. Genetic Engineering and its application . Agropolis Indrapur INDIA.
20. Talwar P.G. Practical Biochemistry for medical students, Puroi Prakash Kendra BOMBAY.
21. Jayaraman J. Laboratory manual in biochemistry: New age , International Publishers
22. Plummer David : An Introduction To Practical Biochemistry,(Tata Mac Graw Hill Books Co -17
23. Cystal Anand . Instrumental Methods - Chemical Analysis, Fine Arts Publishing House .
24. Pitt Swinger Hans : Practical Enzymology, Wiley - VCH Verlag GmbH co.
25. Prescott & Duran: Industrial Microbiology, Mac Graw Hill Co. Ltd.
26. Casida L.H. : Industrial Microbiology Wiley Eastern Ltd, NEW DELHI
27. A.T. Patel : Industrial Microbiology , Mc Millan (India) Ltd. BOMBAY.
28. Strickberger M. : Genetics, Prentice Hall of India Pvt Ltd New Delhi.





2. Amylase enzyme (10pts)

- Baker's yeast
- Biofertilizers (Azot Rhiza, PSB) and Biopesticide production

*Dr. Anand*  
10/10/2020  
Microbiology

**B.Sc. III<sup>rd</sup> year, Microbiology (Semester- VI)**

**Practical papers XXI**

1. Restriction digestion of lambda DNA
2. Isolation of *S. cerevisiae* chromosomal DNA.
3. Separation of *E. coli* DNA by agarose gel electrophoresis.
4. Confirmation and estimation of DNA by diphenylamine
5. Ligation chain reaction
6. (i) Study of DNA uptake in *E. coli* using CaCl<sub>2</sub> treatment  
(ii) detection of recombinant clones on suitable medium.
7. Measurement of B-esterase activity of *S. cerevisiae* / Yeast using ONPG
8. Demonstration of polymerase chain reaction (PCR)

**Practical paper – XXII**

1. Production, detection and estimation of ethanol using *Saccharomyces*
2. Production and estimation of succinic acid by *Aspergillus niger*
3. Production of alpha-amylase by *Aspergillus / Bacillus spp.*
4. Identification of fermentation product by paper chromatography and thin layer chromatography – Urea and CO<sub>2</sub> test
5. Separation of proteins by using agarose gel electrophoresis.
6. Microbiological Assay of penicillin.
7. Study tour and report submission

FACULTY OF SCIENCE  
B.Sc. ( Third Year)(Fifth semester ) Examination  
MICROBIOLOGY  
Paper No- Heredial Genetics

Time 3 Hours		Maximum Marks 50
Q1-	Question on unit-1 Or Question on unit-	Marks-10
Q2-	Question on unit-1-2 Or Question on unit-2	Marks-10
Q3-	Question on unit-1-3 Or Question on unit-3	Marks-10
Q4	Short notes on unit-4	Marks-10
Q5	Multiple choice 10 questions on all units	Marks-10

*Signature*  
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FACULTY OF SCIENCE  
B.Sc. (Third Year) (Fifth Semester) Examination  
MICROBIOLOGY  
Paper-XVII: Microbial Metabolism

Ques-#	Ques	Maximum Marks
Q1	Question on unit-1 Or Question on unit-1	Marks- 5
Q2	Question on unit-2 Or Question on unit-2	Marks-10
Q3	Question on unit-3 Or Question on unit-3	Marks-10
Q4	Short notes on unit-4	Marks- 5
Q5	Write the character of-pesticide on unit-5.	Marks- 10

*(Signature)*



**FACULTY OF SCIENCE**  
**B.Sc. (Third Year) (Sixth Semester) Examination**  
**MICROBIOLOGY**  
**Paper- XIII: Recombinant DNA Technology**

Sl. No.	Questions	Maximum Marks
Q1-	Question on unit-1 Or Question on unit-1	Marks-10
Q2-	Question on unit-2 Or Question on unit-2	Marks-10
Q3-	Question on unit-3 Or Question on unit-3	Marks-10
Q4-	Short answer type-4	Marks-10
Q5	Multiple choice 10 questions over all units	Marks-10

*[Handwritten Signature]*





**FACULTY OF SCIENCE**  
**B.Sc. (Third Year (Sixth Semester) Examination)**  
**MICROBIOLOGY**  
**Paper- XX Industrial Microbiology**

Sl. No./ Marks	Questions/ Marks
Q1-	Question on unit-1 Or Question on unit-1 Marks-10
Q2-	Question on unit-2 Or Question on unit-2 Marks-10
Q3-	Question on unit-3 Or Question on unit-3 Marks-10
Q4-	Short answer type question-4 Marks-10
Q5-	Multiple choice (10 questions on all units)- Marks-10

*(Signature)*

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

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14-50th May, 2023 SAC's for: Calculus (Part Circular No.1) & onwards - 7 -

2

**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, [R Survidha Kendra], in-charge 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.

887-160616/-

**Dr. Babasaheb Ambedkar Marathwada  
University, Aurangabad**



**Syllabus of the  
T.Y. B.Sc.( V and VI Semester)  
In Statistics (Opt. Comp.)  
With effect from the academic  
Year 2015-2016**

## SYLLABUS OF B.Sc. III-YEAR STATISTICS

Semester	Paper No.	Title Of The Paper	No. of Lectures per week	Marks Only.
V	501	Operational Research	03	50
Theory	502	Statistical Inference	03	50

VI	601	Regression & Statistical Quality Control	03	50
Theory	602	Design of Experiment	10	50
V	503	Practical Based on 501	03	50
Annual Practicals	504	Practicals Based on 502	10	50
VI	603	Practical Based on 601	03	50
Annual Practicals	604	Practicals Based on 602	10	50

**SEMESTER-V**  
**PAPER 501: Operations Research**

**Unit-1: Linear Programming Problem (LPP)**

- 1.1 Meaning and Scope of OR, Uses and Limitations of OR
- 1.2 Elementary Theory of Linear Sets and Applications
- 1.3 Feasible and Mathematical Formulation of Standard LPP
- 1.4 Applications of LPP
- 1.5 Some Definitions Solution to LPP: Graphical Solution to LPP etc.
- 1.6 Graphical Solution to LPP
- 1.7 Simplex Method to Solve LPP
- 1.8 Case of Artificial variables

**Unit-2: Transportation and Assignment Problem & Game Theory**

- 2.1 Transportation Problem: Introduction and Application
- 2.2 Mathematical Formulation of LPP
- 2.3 Necessary and Sufficient Conditions for Existence of Feasible Solution to LPP
- 2.4 North West Corner Solution to Transportation Problem by Different Methods
- 2.5 Assignment Problem (AP)
- 2.6 Definition of AP and Applications of AP
- 2.7 Assignment Algorithm
- 2.8 Applications of Assignment Problem
- 2.9 Two Person Zero Sum Games
- 2.10 The Maximin/Minimax Principle
- 2.11 Definition of Saddle Point, Games without a Saddle Point
- 2.12 Graphical Solution to 2 x n and m x 2 Games

**Unit-3: Network Scheduling by PERT & CPM**

- 3.1 Introduction
- 3.2 Basic Concepts: Activities, Nodes, Earliest and Latest Time
- 3.3 Constraints in Networks
- 3.4 Construction of Networks and Time Calculations in Networks
- 3.5 Critical Path Method

## Paper 502: STATISTICAL INFERENCE

### Unit-1: Testing of hypothesis

1. Introduction
2. Statistical hypothesis - Simple and composite
3. Null hypothesis and alternative hypothesis
4. Critical region
5. Error probabilities
6. Level of significance
7. Power curve
8. Steps involved in solving testing of hypothesis problem
9. Most powerful test
10. Key word question (assessment and proof)

### Unit-2: Sequential analysis

1. Introduction
2. Wald's sequential test
3. Power function - Operating characteristics
4. Risk & Riskity
5. Average Sample Number
6. Stopping function
7. Example on average sample size

### Unit-3: Non-Parametric Methods

1. Definition of order statistics
2. Introduction to non-parametric methods and its necessity
3. Advantages and Disadvantages of non-parametric methods over parametric methods
4. Ranks
5. Sign test
6. Median test
7. Mann-Whitney-Wilcoxon Test
8. Spearman's rank correlation test
9. Kolmogorov - Smirnov test (empirical)



**SEMESTER-VI**  
**Paper 601: SQC and R Programming**

**Unit-1: Statistical Quality Control**

- 1.1 Introduction
- 1.2 Process Control and Process Control
- 1.3 Control Charts for Process Control and Tools for SQC
- 1.4 Control Charts for Variables (and Range), and  $\bar{x}$  Chart
- 1.5 Control Charts for Attributes
- 1.6 p-Chart for Fraction Defective
- 1.7 c-Chart for number of Defective
- 1.8 u-Chart for number of Defects

**Unit-2: Acceptance Sampling**

- 2.1 Normal Tolerance and Specification Limits
- 2.2 Modified Control Limits
- 2.3 Single-Sample Acceptance Sampling, by Attributes
- 2.4 Definition of AQL, LTPD Process Average Fraction Defective etc.
- 2.5 OC Curve
- 2.6 Average Sample Number (ASN)
- 2.7 Consumer and Producer Risk
- 2.8 Single Sampling Plan and Double Sampling Plan

**Unit-3: Fundamentals of R-Programming**

- 3.1 Introduction to R: Structure of R, Getting into R, Getting into R, Getting into R, Getting into R, Getting into R
- 3.2 Typing, Editing, Numerical and Complex, Matrix and Vector Arithmetic
- 3.3 Creation of Vectors Using `c()`, `seq()`, `seq_len()`
- 3.4 Arithmetic Operations on Vectors Using Operators `+`, `*`, `^`
- 3.5 Numerical Functions: `log`, `log10`, `sqrt`, `max`, `min`, `unique`, `range`, `length`, `var`, `sd`, `sum`, `summary`, `is.numeric` etc.
- 3.6 Accessing vectors
- 3.7 Alternatives: `Matrix`, `Complex` Matrices by `Matrix` Package
- 3.8 Data Frames: Creation Using `Data Frame`, `subset` and `Transform` Commands
- 3.9 Decision Tree: `Decision` and `Summary`
- 3.10 Functions: `Function` Command

## Paper 602: Design of Experiment

### Unit 0: Introduction & Completely Randomized Design (CRD)

- 1.0 Introduction to design, treatment, various definitions
- 1.1 Principles of Design or Experiment
- 1.2 One way classification (i.e., CRD), it's advantages & disadvantages
- 1.3 Analysis of variance (ANOVA) of one way classified data
- 1.4 Statistical analysis of CRD
- 1.5 Least square estimates of various effects
- 1.6 Variances of these estimates
- 1.7 Detection of various sums of squares
- 1.8 Critical differences

### Unit 1: Randomized Block Design (RBD)

- 2.1 Two-way classification of data, RBD & L.S. layout
- 2.2 It's advantages & disadvantages
- 2.3 Mathematical model & statistical analysis of RBD
- 2.4 Error & its variances of various effects in RBD
- 2.5 Variances of the estimates
- 2.6 Expectations of various sums of squares
- 2.7 Efficiency of RBD relative to CRD
- 2.8 Missing & 4 16, link & free & two missing values

### Unit 2: Latin Square Design (LSD)

- 3.1 Introduction of LSD
- 3.2 Layout of LSD, standard Latin square
- 3.3 Fisher's & Fisher's layout of LSD
- 3.4 Mathematical model & Statistical analysis of a m LSD (one observation per experimental unit)
- 3.5 Error & its variances of various effects in LSD
- 3.6 Variances of the estimates
- 3.7 Expectations of various sums of squares

**PAPER 605: Project Report**

Project on the least-squares method and analysis of variance of real life data.

**PAPER 604: PRACTICAL**

Practical on Design of experiment & QCC

1. Carry out analysis of variance in CRT
2. Carry out analysis of variance in RFD
3. Estimation of One factor  $\eta$  value in RFD
4. Estimation of Two Mixing Process in RFD's efficiency of RFD with respect to CRT & Carry out analysis of variance in RFD
5.  $\bar{X}$  Chart &  $\sigma$  Chart
6. p Chart
7. c Chart.

List of recommended books.

- [1] Fundamentals of Mathematical Statistics B.G. Gupta & V.K. Kapoor
- [2] Statistical Inference H. C. Coatsworth & S. S. Ghosh
- [3] Operations Research, Kanti Swaroop & P.K. Gupta
- [4] Operations Research & Introduction, H. A. Taha
- [5] PPT & PPT, Shree Nath
- [6] Fundamentals of Applied Statistics, S. G. Chaturvedi & V. K. Kapoor
- [7] Quality Control & Industrial Statistics, A. J. Duncan
- [8] Statistics Using R, S. G. Purcell, S. D. Coor & S. J. Deshpande
- [9] Experimental Design, W. G. Cochran and G. M. Cox
- [10] Design and Analysis of experiment M. N. Das and G. P.
- [11] Design and Analysis of experimental, G. Campionese
- [12] Linear Programming Nierfeld, E. Gross