INTRODUCTION

The SRTMUN is gearing up for several initiatives towards academic excellence, quality improvement and administrative reforms. In view of this priority and in-keeping with Vision and Mission; process was already initiated towards introduction of semester system, grading system and credit system. In the recent past, University had already implemented Credit based grading system to campus schools and Choice Based Credit System (**CBCS**) pattern for PG in all the affiliated colleges from the academic year **2014-2015.** These regulations shall be called as Choice Based Course Credit System & Grading, 2014. In short it will be referred as **SRTMUN CBCS REGULATION**.

Now University is going one step ahead to implement Choice Based Credit System (**CBCS**) pattern at UG level from the academic year **2016-2017** progressively for B.Sc. first year, second year and third year respectively. Revision and updating of the curriculum is the continuous process to provide an updated education to the students at large. Presently there is wide diversity in the curriculum of different Indian Universities which inhibited mobility of students in other universities or states. To ensure and have uniform curriculum at UG and PG levels as per the **SRTMUN CBCS REGULATION**, curriculum of different Indian Universities, syllabus of NET, SET, MPSC, UPSC, Forest Services and the UGC model curriculum are referred to serve as a base in updating the same.

The B.Sc. Botany (General) semester pattern course is running in different affiliated colleges of the SRTMUN. The course content has been designed under CBCS pattern. The course content of each theory paper is divided into units by giving appropriate titles and subtitles. For each unit, total number of periods required, weight age of maximum marks and credits are mentioned. A list of practical exercises and skills for laboratory work to be completed in the academic year is also given. A list of selected reading material and a common skeleton question paper for all papers of semester-I, II, III, IV, V&VI are also provided at the end of the syllabus.

OBJECTIVES

1. To provide an updated education to the students at large in order to know the importance and scope of the discipline and to provide mobility to students from one university or state to other.
2. To update curriculum by introducing recent advances in the subject and enable the students to face NET, SET, UPSC and other competitive examinations successfully.
3. To impart knowledge of plant science as the basic objective of Education
4. To develop a scientific attitude to make students open minded, critical and curious
5. To develop an ability to work on their own and to make them fit for the society
6. To expose themselves to the diversity amongst life forms
7. To develop skill in practical work, experiments, equipments and laboratory use along with collection and interpretation of plant materials and data
8. To make aware of natural resources and environment and the importance of conserving the same
9. To develop ability for the application of the acquired knowledge in the fields of life so as to make our country self reliant and self sufficient
10. To appreciate and apply ethical principles to plant science research and studies

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

SEMESTER PATTERN CURRICULUM UNDER CHOICE BASED CREDIT SYSTEM (CBCS) PATTERN FOR

Faculty of Science

Under Graduate (UG) Programmes

SUBJECT: BOTANY

CLASS: B. Sc. FIRST YEAR

An Outline:

Semester/ Annual	Course Name		Paper No. & Title	Total Periods (periods/ week)	Marks for		Credits (Marks)
					External (ESE)	Internal (CA)	
Semester-I	CCB-I	Section-A	**Theory Paper-I:** Diversity of Microbes	45 (03/week)	40	10	Credits: 02 (Marks:50)
		Section-B	**Theory Paper-II:** Cell and Molecular Biology	45 (03/week)	40	10	Credits: 02 (Marks:50)
Semester-II	CCB-II	Section-A	**Theory Paper-III:** Diversity of Cryptogams	45 (03/week)	40	10	Credits: 02 (Marks:50)
		Section-B	**Theory Paper-IV:** Genetics and Plant Breeding	45 (03/week)	40	10	Credits: 02 (Marks:50)
Annual pattern	CCBP-I		**Practical Paper-V:** Practicals based on theory papers of CCB-I&II	24 Prac. (03/week/ batch)	80	20	Credits: 04 (Marks:100)
				Total	**240**	**60**	**Credits: 12 (Marks:300)**

CCB: Core Course Botany, **CCBP:** Core Course Botany Practical, **ESE:** End of semester examination, **CA:** Continuous Assessment

Distribution of marks: 80% of the total marks for ESE and 20% for CA

- **CA of Marks-10:** 05 marks for Test/ Assignments & 05 marks for attendance
- **CA of Marks-20:** 10 marks for Test/ Assignments & 10 marks for attendance

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

SEMESTER PATTERN CURRICULUM UNDER CHOICE BASED CREDIT SYSTEM (CBCS) PATTERN FOR

Faculty of Science

Under Graduate (UG) Programmes

SUBJECT: BOTANY

CLASS: B. Sc. SECOND YEAR

An Outline:

Semester/ Annual	Course Name		Paper No. & Title	Total Periods (periods/ week)	Marks for		Credits (Marks)
					External (ESE)	Internal (CA)	
Semester-III	CCB-III	Section-A	**Theory Paper-VI:** Morphology and Taxonomy of Angiosperms	45 (03/week)	40	10	Credits: 02 (Marks:50)
		Section-B	**Theory Paper-VII:** Histology, Anatomy and Embryology of Angiosperms	45 (03/week)	40	10	Credits: 02 (Marks:50)
Semester-IV	CCB-IV	Section-A	**Theory Paper-VIII:** Gymnosperms and Palaeobotany	45 (03/week)	40	10	Credits: 02 (Marks:50)
		Section-B	**Theory Paper-IX:** Ecology and Environmental Biology	45 (03/week)	40	10	Credits: 02 (Marks:50)
Annual pattern	CCBP-II	Section-A	**Practical Paper-X:** Practicals based on theory papers-VI& VIII	12 Prac. (03/week/ batch)	40	10	Credits: 02 (Marks:50)
		Section-B	**SEC-I: (1 Skill/Optional)**	(03/week/ batch)	--	50*	Credits: 02* (Marks:50)
Annual pattern	CCBP-III	Section-A	**Practical Paper-XI:** Practicals based on theory papers-VII& IX	12 Prac. (03/week/ batch)	40	10	Credits: 02 (Marks:50)
		Section-B	**SEC-II: (1 Skill/Optional)**	(03/week/ batch)	--	50*	Credits: 02* (Marks:50)
Total Credits Semester-III and IV					**240**	**60 (100*)**	**Credits: 12 (04*) (Marks:300) (marks:100*)**

CCB: Core Course Botany, **CCBP:** Core Course Botany Practical, **ESE:** End of semester examination, **CA:** Continuous Assessment, **SEC:** Skill Enhancement Course, ***:** Credits/three options

Distribution of credits: 80% of the total credits for ESE and 20% for CA

- **CA of Marks-10:** 05 marks for Test/ Assignments & 05 marks for attendance
- **SEC of Marks 50*:** 15marks /1skill/optional & 05 marks for attendance/three options i.e. 50/3= 15 +5 (for attendance/ three options)

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

SEMESTER PATTERN CURRICULUM UNDER CHOICE BASED CREDIT SYSTEM (CBCS) PATTERN FOR

Faculty of Science

Under Graduate (UG) Programmes

SUBJECT: BOTANY

CLASS: B. Sc. THIRD YEAR

An Outline:

Semester/ Annual	Course Name		Paper No. & Title	Total Periods (periods/ week)	Marks for		Credits (Marks)
					External (ESE)	Internal (CA)	
Semester-V	DSEB-V	Section-A	**Theory Paper-XII:** Plant Physiology	45 (03/week)	40	10	Credits: 02 (Marks:50)
		Section-B	**Theory Paper-XIII:** Plant Pathology-I **OR** **Theory Paper-XIII:** Systematic Botany-I **OR** **Theory Paper-XIII:** Applied Economic Botany-I **OR** **Theory Paper-XIII:** Herbal Technology-I	45 (03/week)	40	10	Credits: 02 (Marks:50)
Semester-VI	DSEB-VI	Section-A	**Theory Paper-XIV:** Plant Metabolism, Biochemistry and Biotechnology	45 (03/week)	40	10	Credits: 02 (Marks:50)
		Section-B	**Theory Paper-XV:** Plant Pathology-II **OR** **Theory Paper-XV:** Systematic Botany-II **OR** **Theory Paper-XV:** Applied Economic Botany-II **OR** **Theory Paper-XV:** Herbal Technology-II	45 (03/week)	40	10	Credits: 02 (Marks:50)
Annual pattern	DSEBP-I	Section-A	**Practical Paper-XVI:** Practicals based on theory papers-XII&XIV	12 Prac. (03/week/ batch)	40	10	Credits: 02 (Marks:50)
		Section-B	**SEC-III: (1 Skill/Optional)**	01 Skill (03/week/ batch)	--	50*	Credits: 02* (Marks:50)

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

SEMESTER PATTERN CURRICULUM UNDER CHOICE BASED CREDIT SYSTEM (CBCS) PATTERN FOR

Faculty of Science

Under Graduate (UG) Programmes

SUBJECT: BOTANY

Semester/ Annual	Course Name		Paper No. & Title	Total Periods (periods/ week)	Marks for		Credits (Marks)
					External (ESE)	Internal (CA)	
Annual pattern	DSEBP-II	Section-A	**Practical Paper-XVII:** Practicals based on theory papers-XIII&XV	12 Prac. (03/week/ batch)	40	10	Credits: 02 (Marks:50)
		Section-B	**SEC-IV: (Project)**	(03/week/ batch)	--	50*	Credits: 02* (Marks:50)
Total Credits Semester-V and VI					**240**	**60 (100*)**	**Credits: 12 (Marks:300) Credits: (04*) (Marks:100*)**

CCB: Core Course Botany, **CCBP:** Core Course Botany Practical, **ESE:** End of semester examination, **CA:** Continuous Assessment, **SEC:** Skill Enhancement Course, **DSEB:** Discipline Specific Elective Botany, **DSEBP:** Discipline Specific Elective Botany Practical, *: Credits/three options

Distribution of credits: 80% of the total credits for ESE and 20% for CA

- **CA of Marks-10:** 05 marks for Test/ Assignments & 05 marks for attendance
- **SEC –III of Marks 50*:** 15marks /1skill/optional & 05 marks for attendance/three options i.e. 50/3= 15 +5 (for attendance/ three options)
- **SEC –IV (Project) of Marks 50*:** 50 marks /project/optional

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

SEMESTER PATTERN CURRICULUM UNDER

CHOICE BASED CREDIT SYSTEM (CBCS) PATTERN FOR

Faculty of Science

Under Graduate (UG) Programmes

SUBJECT: BOTANY

CLASS: B. Sc. FIRST YEAR, SEMESTER–I

CORE COURSE BOTANY (CCB)-I

SECTION-A

(THEORY PAPER–I: DIVERSITY OF MICROBES)

Periods: 45 **Credits: 02 (Maximum Marks: 50)**

UNIT – I: VIRUSES AND MYCOPLASMA *(10 periods)*

Viruses: General characters, Classification based on host, Structure of plant viruses (TMV), Transmission of viruses, Economic importance of viruses, Yellow vein mosaic of Bhendi and Bean mosaic; **Mycoplasma:** General characters, Systematic position and Structure, Little leaf of Brinjal; **Prions:** General characters.

UNIT – II: BACTERIA *(13 periods)*

Bacteria: General characters, Ultra structure of bacterial cell, Mode of nutrition, asexual reproduction (By binary fission), Sexual reproduction (By conjugation); **Cyanobacteria:** Salient features of cyanobacteria, Systematic position, habitat, distribution, structure and reproduction in *Nostoc;* **Archaebacteria:** Habit and Forms; Economic importance of bacteria in industries, medicines and agriculture.

UNIT – III: FUNGI *(10 periods)*

General characters fungi Classification of fungi (as per Alexopoulos and Mims, 1979), **Type study:** Systematic position, occurrence, structure of mycelium, reproduction and graphic life cycle of ***Albugo*** and ***Eurotium***

UNIT – IV: FUNGI AND LICHENS *(12 periods)*

Fungi: Systematic position, occurrence, structure of mycelium, reproduction and graphic life cycle of ***Puccinia*** and ***Alternaria,*** Economic Importance of fungi in industries, medicines, food and agriculture; **Lichens:** General characters, Classification, Types and Economic importance.

CLASS: B. Sc. FIRST YEAR, SEMESTER–I
CORE COURSE BOTANY (CCB)-I
SECTION-B
(THEORY PAPER–II: CELL AND MOLECULAR BIOLOGY)

Periods: 45 **Credits: 02 (Maximum Marks: 50)**

UNIT–I: CELL BIOLOGY-I (*10 periods)*

Introduction to cell biology, Ultra structure of prokaryotic and eukaryotic cell, Ultra structure and function of Nucleus (Nuclear membrane and nucleolus), Ultra structure and function of Cell organelles: Golgi complex, Lysosome, Endoplasmic reticulum and Ribosome.

UNIT–II: CELL BIOLOGY-II (*13 periods)*

Chromosome: Morphology, structure, chemical composition, euchromatin, heterochromatin and function of typical chromosome, Study of Karyotype and ideogram of human being, Structure and significance of giant chromosomes- Polytene and Lampbrush chromosomes, **Cell division:** Cell cycle, Process and significance of Mitosis and Meiosis.

UNIT-III: MOLECULAR BIOLOGY-I *(12 periods)*

Nucleic acids: Introduction, chemical composition, **DNA:** Structure (Watson & Crick model), forms (A, B, Z) and Semi conservative replication (Meselson and Stahl experiment), **RNA:** Structure, function and types

UNIT-IV: MOLECULAR BIOLOGY-II *(10 periods)*

Gene concept: Classical (Morgan'view), Fine structure of gene (S. Benzer), Gene mutations (spontaneous and induced) and related diseases (transposable genetic elements, phenyl ketonuria, Alkaptonuria, Albinism, Sickle cell anemia and Amniocentesis (detection of genetic diseases).

CLASS: B. Sc. FIRST YEAR, SEMESTER–II
CORE COURSE BOTANY (CCB)-II
SECTION-A
(THEORY PAPER–III: DIVERSITY OF CRYPTOGAMS)

Periods: 45 **Credits: 02 (Maximum Marks: 50)**

UNIT – I: ALGAE –I *(10 periods)*

General characters of algae, Classification of algae (As per F.E.Fritsch, 1935), Systematic position, occurrence, thallus structure, reproduction and graphic life cycle with alternation of generation of ***Oedogonium*** and ***Chara***

UNIT – II: ALGAE-II *(10 periods)*

Systematic position, occurrence, thallus structure, reproduction and graphic life cycle with alternation of generation of ***Ectocarpus*** and ***Batrachospermum,*** Economic importance of algae (Food and fodder)

UNIT – III: BRYOPHYTA *(12 periods)*

General characters of Bryophytes, Classification of Bryophytes (As per N.S.Parihar), Systematic position, occurrence, thallus structure (external and internal), reproduction and graphic life cycle with alternation of generation of ***Riccia*** and ***Funaria*** *(*Developmental stages not expected), Economic importance of Bryophytes

UNIT – IV: PTERIDOPHYTA (*13 periods)*

General characters of Pteridophytes, Classification of Pteridophytes (as per N.S.Parihar), Systematic position, occurrence, structure of sporophyte (external and internal), reproduction and graphic life cycle with alternation of generation of ***Equisetum*** and ***Marsilea*** (Developmental stages not expected)

CLASS: B. Sc. FIRST YEAR, SEMESTER–II
CORE COURSE BOTANY (CCB)-II
SECTION-B
(THEORY PAPER–IV: GENETICS AND PLANT BREEDING)

Periods: 45 **Credits: 02 (Maximum Marks: 50)**

UNIT –I: GENETICS-I *(13 periods)*

Genetic Inheritance- Mendelism, Mendel's Laws of inheritance- Explanation and examples of Monohybrid cross, Dihybrid cross, Back cross and Test cross, Gene interaction and epistasis- (Allelic and non allelic), explanation and examples of complementary gene action (9:7), supplementary gene action (9:3:4), epistatic gene action (12:3:1) and Duplicate gene action (15:1), Sex determination: Discovery of sex chromosomes, chromosomal theory of sex determination - in insects (XO-XX), Birds (ZW-ZZ method), Animals (Drosophila and Man), Plants (Melandrium).

UNIT –II: GENETICS-II *(12 periods)*

Sex linked inheritance- Definition, classification (x-linked, y-linked and xylinked), Sex linked inheritance in Drosophila (White eye colour) and Sex linked inheritance in Man (Hemophilia, Colour blindness) Holandric gene – hypertrochosis and Sex linked inheritance in Birds-Barred feathers. Chromosomal Aberrations (Numerical): Polyploidy (Haploids, diploids, Triploids, Tetraploids and polyploids) Euploidy- Autoployploidy and Allopolyploidy with reference to Raphanobrassica and Hexaploid wheat , Aneuploidy (hyper and Hypoploidy), Human syndromes (Autosomal and sex - chromosomal syndromes)- Down's syndrome, Turner's Syndrome and Klinfelters syndrome.

UNIT –III: PLANT BREEDING *(10 periods)*

Introduction, objective of plant breeding, **Methods of plant breeding:** Selection-Mass selection, Pure line selection, Clonal selection, Hybridization- definition, objectives, various steps and application, Heterosis- Definition; effects, utilization and limitation

UNIT –IV: PLANT BREEDING *(10 periods)*

Plant Introduction and Acclimatization: introduction, types, advantages and disadvantages, **Mutational breeding:** objectives, procedure and application, methods of mutational breeding with reference to groundnut, Male sterility; Genetic male sterility, Cytoplasmic male sterility.

CLASS: B. Sc. FIRST YEAR
ANNUAL PATTERN
CORE COURSE BOTANY PRACTICAL (CCBP)-I
(PRACTICAL PAPER–V: BASED ON THEORY PAPER-I, II, III&IV)

Practicals: 24 **Credits: 04 (Maximum Marks: 100)**

Practical Exercises:

1. Study of symptoms of Yellow vein mosaic of Bhendi and Little leaf of Brinjal **(1 practical)**
2. Morphological study of Bacteria by Gram staining method **(1 practical)**
3. Study of systematic position and external features of *Nostoc* **(1 practical)**
4. Study of Fungi- Systematic position, external and internal features of *Albugo, Eurotium, Puccinia, Alternaria* **(2 practical)**
5. Study of Crustose, Foliose and Fructicose forms of lichens**(1 practical)**
6. Study of Algae-Systematic position and external features of *Oedogonium, Chara, Ectocarpus* and *Batrachaospermum* **(3 practical)**
7. Study of Bryophytes- Systematic position, external and internal features of *Riccia* and *Funaria* **(2 practical)**
8. Study of Pteridophytes- Systematic position, external features of adult sporophyte and T.S. of stem of *Equisetum and s*ystematic position, external features of adult sporophyte and T.S. of stem and petiole of *Marsilea* **(2 practical)**
9. Study of cell organelles prescribed in theory using Charts/models/ slides/ photograph/ Photostat copy **(1 practical)**
10. Study of Polytene and Lampbrush chromosomes with the help of permanent slides/ photograph/ Photostat copy **(1 practical)**
11. Study of Cell division – Mitosis and meiosis **(5 practical)**
12. Problems based on Monohybrid and Dihybrid ratios, Interaction of Allelic gene- Complementary gene action (9:7) and supplementary gene action (9:3:4), Non-allelic gene (Epistasis) -Epistatic gene action (12:3:1), Duplicate gene action (15:1) and sex linked inheritance **(5 practical)**
13. Study of human syndromes (as mentioned in theory syllabus) by using photocopies **(1 practical)**
14. Botanical excursions (One short and one long) are compulsory **(4 practical)**

Note: *Students should submit excursion report in detail in the practical examination for evaluation. The report shall carry marks*

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

SEMESTER PATTERN CURRICULUM UNDER

CHOICE BASED CREDIT SYSTEM (CBCS) PATTERN FOR

Faculty of Science

Under Graduate (UG) Programmes

SUBJECT: BOTANY

CLASS: B. Sc. FIRST YEAR

ANNUAL PATTERN

CORE COURSE BOTANY PRACTICAL (CCBP)-I

(PRACTICAL PAPER–V: BASED ON THEORY PAPER-I, II, III&IV)

END OF SEMESTER EXAMINATION (ESE)

Skeleton question paper

Time: Four hours **Maximum Marks: 80**

Note: *(i) Attempt all questions*

(ii) Show your preparation to the examiner

(iii) Draw neat and well labelled diagrams wherever necessary

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Q1. Identify, classify and describe the given specimen-**A** (Fungi) on the basis of external and internal characters (The specimen-A may be given alternately to the students) **(12 marks)**

Q2. Identify, classify and describe any two algae from the given algal mixture on the basis of external characters **(12 marks)**

Q3. Identify, classify and describe the given specimen-**B** (Bryophytes /Pteridophytes) on the basis of external and internal characters (The specimen-C may be given alternately to the students) **(12 marks)**

Q4. Prepare a temporary squash / smear of the given material- **C.** Identify and describe any two stages of mitosis / meiosis giving reasons (The material-E for mitosis and meiosis may be given alternately to the students) (**14 marks)**

Q5. Solve a problem based on Dihybrid ratio / Interaction of Allelic gene / Interaction of Non-allelic gene/ Duplicate gene/ Sex linked inheritance (the problems may be given alternately to the students) **(08 marks)**

Q6. Identify and describe giving reasons (4 spots): Viruses / Mycoplasma / Bacteria/ Fungi/ Lichens-1, Bryophytes /Pteridophytes-1, Cell Biology-1, Syndrome-1 (**08 marks)**

Q7. **(I)** Record Book **(10 marks)**

(ii) Submission of Excursion report and Collection **(04 marks)**

Distribution of credits for B.Sc. Electronics (Optional)

Under Faculty of Science

B. Sc. Syllabus structure

Semester Pattern effective from June 2016

Subject: Electronics

Semester	Paper No.	Name of the Course	Periods/ Week	Total period	Internal Evaluation	Marks of Semester	Total Mark	Credits
I	CCEI (Section A)	Electronic Components & circuit analysis ((PI)	03	45	10	40	50	2
	CCEI (Section B)	Fundamentals of Digital Electronics (PII)	03	45	10	40	50	2
II	CCEII (Section A)	Semiconductor Devices & Instrumentation (PIII)	03	45	10	40	50	2
	CCEII (Section B)	Combinational & Sequential logic circuits (PIV)	03	45	10	40	50	2
	CCEP I [CCE I & II (Section A & B)]	Practical's based on Section A & Section B of CCE I & CCE II (PV)	03		20	80	100	4
							Total credits semester I and II: 12	

III	CCE III (Section A)	Amplifiers, Oscillators & Multivibrators (P-VI)	03	45	10	40	50	2
	CCEIII (Section B)	Fundamentals of Microprocessors (P-VII)	03	45	10	40	50	2
	CCEP II [CCE III & IV (Section A)]	Practical's based on P-VI & P-VIII (P-X)	03		10	40	50	2
	CCEP II [CCE III & IV (Section B)]	SEC I (1 Skill/ optional)			15×3 = 45	-	-	(02)*
IV	CCE IV (Section A)	Op-Amp, It's Applications & Some specialized ICs (P-VIII)	03	45	10	40	50	2
	CCE IV (Section B)	Microprocessor Interfacing (P-IX)	03	45	10	40	50	2
	CCEP III [CCE III & IV (Section B)]	Practical's based on P-VII & P-IX (P-XI)	03		10	40	50	2
	CCEP III [CCEIII & IV (Section B)]	SEC II (1 Skill / optional)			15×3 = 45	-	-	(02)*
							Total credits semester III and IV	12(04)*

Semester	Course No.	Name of the Course	Instruction Hrs/ week	Total period	Internal Evaluation	Marks of Semester	Total Marks	Credits
V	DECE I (Section A)	Communication Electronics – I (P-XII)	03	45	10	40	50	2
	DECE I [(Section B) Elective]	Power Electronics - I Or Introduction to Microcontroller 8051 (P-XIII)	03	45	10	40	50	2
	DECCEP I [DECE I & II (Section A)]	Practical's based on P- XII & PXIV (P-XVI)	03		10	40	50	2
	DECEP II [DECE I& IV (Section B)]	SEC III (1 Skill/ optional)			15×3 = 45	-	-	(02)*
VI	DECEII (Section A)	Communication Electronics - II (P-XIV)	03	45	10	40	50	2
	DECE II [(Section B) Elective]	Power Electronics - II Or 8051 Microcontroller & Embedded systems (P-XV)	03	45	10	40	50	2
	DECEP II) [DECE I & II (Section B)]	Practical's based on P- XIII & P-XIV (P-XVII)	03		10	40	50	2
	DECEP II(Section B)	SEC IV (Project))			5O	-	50	(2)*
Total credits semester V and VI								12(04)*

Paper-I
Electronic Components and Circuit Analysis

SEMESTER: I (CBCS PATTERN)

CCE-I Section :A

Periods: 45 **(Maximum Marks: 50)** **Credits:2**

Unit – I : Passive components: (15 periods)

Resistors: wire-wound resistors, carbon composition resistors, carbon film resistors, cermet film resistors, metal film resistors, power rating, variable resistors, fusible resistors, resistor colour code and Bands.

Inductor: Types of Inductor, Inductance of an inductor, another definition of inductance, mutual inductance, variable inductors, inductors in series or parallel without M, reactance offered by a coil, impedance offered by a coil, Q-factor of a coil.

Capacitors: capacitor connected to a Battery, capacitance, factors controlling capacitance, fixed capacitors, voltage ratings of capacitors, capacitors in series, capacitors in parallel, capacitor connected across an AC source, capacitive Reactance.

Transformer, transformer working.

(Numerical Problems)

(Book – I)

Unit II : Circuit analysis- I (07 periods)

Kirchhoff's current law, Kirchhoff's voltage law, determination of algebraic sign, proportional voltage formula in a series circuit, series voltage dividers, proportional current formula, opens in parallel circuit, shorts in a parallel circuit.

(Numerical Problems)

(Book – I)

Unit III : Circuit analysis – II. (10 periods)

Ideal constant voltage source, Ideal constant current source, super position theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem (with steps for simplification.)

(Numerical Problems) (Book – I)

Unit – IV : A.C. Fundamentals: (13 periods)

Introduction, types of alternating waveforms.

Definitions: Cycle, time period, frequency, amplitude.

Characteristics of a sine wave, Audio and radio frequencies. Different values of sinusoidal voltage and current, phase of an AC, phase difference, vector representation of an alternating quantity, Harmonics, R-L-C circuit, resonance in series R-L-C circuit, Resonance curve, Bandwidth of series resonant circuit.

(Numerical Problems) (Book – I)

References:

1. Basic Electronics Solid State (Multicolour illustrative edition), by B.L. Theraja, Pub.: S.Chand &Company Ltd., Ramnagar, New Delhi – 110055.
2. Basic Electronics (eighth edition), by Bernard Grob, Pub.: Glencoe Mc Graw Hill, Pub. Company.
3. A Textbook of Electrical Technology, by B.L. Theraja, Vol.1, Nirja Construction & Development Company.
4. Principles of Electronics (Multicolour revised edition), by V.K. Mehta, Rohit Mehta, S. Chand & Company, Ram Nagar, New Delhi - 110055.

Paper – II
Fundamentals of Digital Electronics

Periods: 45 **(Maximum Marks: 50)** **Credits:2**

Unit-I : **(1**5 Periods)

Number Systems and Codes

Decimal numbers, binary numbers, binary arithemetic, 1's and 2's complements, octal numbers, hexadecimal numbers, inter-conversions of number systems, Digital codes: Binary coded decimal (BCD), Gray code, Excess-3 code, Format of ASCII code.

(Numerical Problems)

Unit – II : (15 Periods)

Logic Gates

Positive and negative logic,Definition, Symbol and Truth table of NOT gate, OR gate, AND gate, NAND gate, NOR gate, EX-OR gate and EX-NOR gate. universal properties of NAND and NOR gates.

Unit – III: (07 Periods)

Boolean Algebra

Boolean operations, logic expressions, rules and laws of Boolean algebra, DeMorgan's theorems, simplification of Boolean expressions using Boolean algebra techniques.

(Numerical Problems)

Unit – IV : (08 Periods)

K-mapTechniques

SOP and POS for of Boolean expressions for logic network, minterms, maxterms, simplification of Boolean expressions using Karnaugh map techniques (up to 4 variables) for SOP.

(Numerical Problems)

References:

1. Digital Principles and Applications – A.P. Malvino, McGraw Hill International Editions (Fourth Edition)
2. Modern Digital Electronics – R.P. Jain, Tata McGraw Hill Pub. Company (Third Edition)
3. Digital Fundamentals – Thomas L. Floyd, Universal Book Stall.
4. Digital Electronics: An Introduction to Theory and Practice-William H. Gothmann, Prentic Hall, India.
5. Digital Electronics with Practical Approach – G.N. Shinde, Shivani Pub., Nanded.

Paper – III
Semiconductor Devices and Instrumentation

Periods: 45 **(Maximum Marks: 50)** **Credits:2**

Unit – I : (10 Periods)

Semiconductor Diodes:

Construction, working and V/I characteristics of P-N Junction diode, Zener diode, LED, Photodiode, varactor diode.

(Numerical Problems)

Unit – II : (15 Periods)

Transistors :

Construction of NPN and PNP transistor, F-F, R-R-, F-R biasing, α_{dc} and β_{dc} of a transistor and their relationship, C-E transistor Characteristics: Collector curves and base curves. Construction, working and characteristics of JFET, construction,working and characteristics of MOSFET.

(Numerical Problems)

Unit – III : (10 Periods)

Rectifiers and Voltage Regulators

Block diagram of a power supply, half and full wave rectifiers, bridge rectifier, load regulation and line regulation, zener shunt regulator.

(Numerical Problems)

Unit – IV: (10 Periods)

CRO and Multimeter:

Multimeter, applications of multimeter, sensitivity of multimeter.

Cathode ray oscilloscope, cathode ray tube, deflection sensitivity of CRT, applying signal across vertical plates, display signal waveforms on CRO, signal pattern on screen, various controls of CRO, applications of CRO.

(Numerical Problems) (Book-3)

References:

1. Electronic principles, A.P. Malvino, Tata Mc. Graw Hill, Pub. Co.Ltd., (Third edition)
2. Basic electronics solid state (multicolour illustrative edition), B.L. Theraja, S.Chand & Company Ltd., Ram Nagar, New Delhi – 110055.
3. Principles of electronics: V.K. Mehta & Rohit Mehta (Multicolour revised edition) S. Chand & Company.
4. Basic electronics (eighth edition) Bernard Grob, Glencoe Mc. Graw Hill Pub., Company.

Paper – IV
Combinational and Sequential Logic Circuits

Periods: 45 **(Maximum Marks: 50)** **Credits:2**

Unit – I : (14 Period)

Arithmetic and Combinational Logic Circuits

Half adder, full adder, parallel binary adder, introduction of encoder, decoders, multiplexer and demultiplexers with suitable example.

Unit – II : (09 Period)

Flip-Flops

SR latch , SR flip flop, JK flip flop, Master Slave JK flip flop, D type flip flop, T type flip flop.

Unit – III : (17 Period)

Counters and Registers

Asynchronous counters : two, three, four bit and decade counter.

Synchronous counters : two, three, four bit counter and decade counter, modulus of the counter, mod-3 and mod-5 counters, ring counter.

Shift Registers : Serial-in Serial-out, Serial in - Parallel out, parallel in - serial out, parallel in - parallel out configurations.

Unit – IV : (5 Period)

ADC and DAC convertors :

Digital to analog converter (R-2R ladder network), Analog to digital convertor (comparator type)

References:

1. Digital Principles and Applications – A.P. Malvino, McGraw Hill International Editions (Fourth Edition).
2. Modern Digital Electronics – R.P. Jain, Tata McGraw Hill Pub. Company (Third Edition)
3. Digital Fundamentals – Thomas L. Floyd, Universal Book Stall.
4. Digital Electronics with Practical Approach-G.N. Shinde, Shivani Pub., Nanded.

Paper – V

(Practicals based on Paper-I, II, III and IV)

ELEC V: Laboratory Course Work

(CBCS PATTERN)

Periods: 80 **(Marks: 100)** **Credits: 4**

Note : (i) Every student must perform at least 12 experiments, not less than SIX Experiments from each group.

(ii) Use graphs wherever necessary.

Group I :

1. Identification of electronic components: Resistors, Capacitors, Inductors, transformers, diodes & transistors.
2. Study of electronic instruments: Voltmeter, Ammeter and Multimeter.
3. Study of Electronic instruments: Power supply, signal generator and CRO.
4. Determination of value of given resistors by using colour code method & verification of it by multimeter.
5. Determination of amplitude, frequency and time period of observed voltage waveform by using CRO.
6. Verification of Thevenin's theorem.
7. Study of Maximum power transfer theorem and determination of internal resistance of a source.
8. Study of P-N junction diode characteristics and determination of bulk resistance.
9. LED characteristics.
10. Photo diode characteristics.
11. Study of Zener diode characteristics and determination of breakdown voltage.
12. Study of Common-Emitter transistor characteristics and determination of β_{dc}.
13. JFET characteristics.
14. Study of Series resonance circuit and determination of its bandwidth and Q-factor.
15. Study of Half wave rectifier and determination of ripple factor and efficiency (η)
16. Study of Full wave rectifier and determination of ripple factor and efficiency (η)
17. Study of Zener shunt regulator, line and load regulation characteristics.

Group II :

1. Study of basic gates (verification of truth table) using ICs.
2. Construction of basic gates using NAND gates.
3. Construction and study of half adder using NAND gates.
4. Construction and study of full adder using NAND gates.
5. Implementation of Boolean expression from the given truth table using K-map.
6. Verification of De Morgan's First theorem.
7. Verification of De Morgan's Second theorem.
8. Construction and study of JK, T-type and D-type flip-flops using IC 7476.
9. Study of decade counter using IC 7490.
10. Construction and study of Serial in – Serial out shift register using IC 7495.
11. Mod-16 asynchronous counter using IC 7493.
12. 4-bit binary to Gray converter using IC 7486.

Swami Ramanand Teerth Marathwada University, Nanded

B. O. S. In Chemistry
B. Sc. First Year (Chemistry)

Semester-I & II

C B C S

In force from June - 2016

Distribution of credits for B.Sc. Chemistry (optional)

Under Faculty of Science

B. Sc. Syllabus structure

Semester Pattern (CBCS) effective from June, 2016

Subject: Chemistry

Total credits semester I and II:

12

Note:

Semester	Paper No.	Name of the Course	Instruction Hrs/ week	Total period	Internal Evaluation	Marks of Semester	Total Marks	Credits
I	CCC I (Section A)	Organic + Inorganic Chemistry, **P-I**	02+01=03	30+15=45	10	40	50	2
	CCC I (Section B)	Physical + Inorganic Chemistry, **P-II**	02+01=03	30+15=45	10	40	50	2
II	CCC II (Section A)	Organic + Inorganic Chemistry, **P-III**	02+01=03	30+15=45	10	40	50	2
	CCC II (Section B)	Physical + Inorganic Chemistry, **P-IV**	02+01=03	30+15=45	10	40	50	2
	CCC P-I (CCC- I & II), (section A&B)	Practical's based on Section A & Section B of CCC- I & CCCC- II **(P-V)**	04	20 Practicals	20	80	100	4

- The syllabus is based on six (3*2) theory periods and four practical periods per batch per week. Candidates should require passing separately in theory and practical examinations.
- Theory examination 40 marks (30+10 mcq for each paper).
- Internal evaluation 10 marks (test for assignment and attendance).
- At least twenty practicals should be taken: **6** practicals from Inorganic Chemistry, **8** from Organic and **6** from Physical Chemistry.

Semester	Paper No.	Name of the Course	Instruction Hrs/ week	Total period	Internal Evaluation	Marks of Semester	Total Marks	Credits
III	CCC III (Section A)	Organic + Inorganic Chemistry, **P-VI**	02+01=03	30+15=45	10	40	50	2
	CCC III (Section B)	Physical + Inorganic Chemistry**, P-VII**	02+01=03	30+15=45	10	40	50	2
	CCCP II (CCC III &IV) (Section-A)	Practical based on P-VI &P VIII (**P-X)**	04	20 practical	10	40	50	2
	CCCP II (CCC III &IV) (Section-A)	SEC-I(1 Skill/ optional)			15*3=45			(02)*
IV	CCC IV (Section A)	Organic + Inorganic Chemistry, **P-VIII**	02+01=03	30+15=45	10	40	50	2
	CCC IV (Section B)	Physical + Inorganic Chemistry, **P-IX**	02+01=03	30+15=45	10	40	50	2
	CCCP III (CCC III & IV) (Section-B)	Practical based on P-VII & P-IX (**P-XI)**	04	20 practical	10	40	50	2
	CCCP III (CCC III &IV) (Section-B)	SEC-II(1 Skill/ optional)			15*3=45			(02)*

Total credits semester III and IV: 12 (04)*

Semester	Course No.	Name of the Course	Instruction Hrs/ week	Total period	Internal Evaluation	Marks of Semester	Total Marks	Credits
V	DECC I (Section A)	Organic + Inorganic Chemistry **(P-XII)**	03	45	10	40	50	2
	DECC I [(Section B) Elective]	Physical + Inorganic Chemistry**(P-XIII)** OR Applications of Computers in Chemistry OR Green Chemistry OR Inorganic Materials of Industrial Importance, etc.	03	45	10	40	50	2
	DECCP I [DECC I & II (Section A)]	Practical's based on P- XII & PXIV**(P-XVI)**	04	20 Practicals	10	40	50	2
	DECCP II [DECC I& II (Section A)]	SEC III (1 Skill/ optional) Basic Analytical Chemistry OR Chemical Technology and Society OR Business Skills for Chemists OR Analytical Clinical Biochemistry, etc			15×3 = 45	-	-	(02)*
VI	DECC II (Section A)	Organic + Inorganic Chemistry **(P-XIV)**	03	45	10	40	50	2
	DECC II [(Section B) Elective]	Physical + Inorganic Chemistry **(P-XV)** OR Instrumental Methods of Analysis OR Organometalics, Bioinorg - anic Chemistry, Poly - nuclear hydrocarbons and UV, IR, Spectroscopy OR Molecules of Life, etc.	03	45	10	40	50	2
	DECCP III) [DECC I & II (Section B)]	Practical's based on P- XIII & P-XV **(P-XVII)**	04	20 Practicals	10	40	50	2
	DECCP-IV DCCI and II (Section B)	**SEC IV Project-work.**			5O	-	50	(2)*
Total credits semester V and VI								**12(04)***

B. Sc. Chemistry
First Year (Semester-I) CBCS
Paper-I Organic + Inorganic Chemistry (CCC-I, Section –A)

Credits: 02 **Periods: 45**

Part- I
Organic Chemistry

Unit-I

1. Nomenclature of Organic Compounds : 06

Functional groups and types of organic compounds, Basic rules of IUPAC nomenclature, Nomenclature ofmono- and bi-functionalcompounds on the basis of priority order of the following classes of compounds: alkanes,alkenes, alkynes, haloalkanes, alcohols, ethers, aldehydes, ketones,carboxyclic acids, carboxylic acid derivatives (acid halides, esters, anhydrides, amides), nitro compounds, nitriles and amines; Nomenclature of aromatic compounds: mono-, di-, and polysubstitutedbenzene (with not more than two functional groups),Monosubstitutedfused polycyclic arenes – naphthalene, anthraceneand phenanthrene. Nomenclature of bicyclic compounds.

2. Basic Concepts In Organic Chemistry : 07

Substrate and Reagents.

Types of reagents(Electrophilic and Nucleophilic).
Homolytic and heterolytic fission.
Electron mobility:

a) Inductive effect (effect on acidic strength of the following acid: acetic acid, propanoic acid and α-chloro acetic acid)
b) Mesomerism (aniline, nitrobenzene)

c) Hyperconjugation (toluene)

d) Stearic effect(mesitoic acid)

Formation and Study of reaction intermediates with stability order (Carbocations, Carbanions, Freeradicals,CarbenesNitrenes, Arynes.)
Types of organic reaction: Substitution, Addition, Elimination, Rearrangement. (With one example)

Unit-II

3. Alkanes and Cycloalkanes : 04

3.1 Alkanes
Introduction, Preparation of alkane from a) Hydrolysis of Grignard reagent
b) Kolbes synthesis c) Corey House synthesis

Chemical Reactions:

a) Pyrrolysis (mechanism) b) Aromatization

3.2 Cycloalkanes Introduction, Synthesis from a) Adipic Acid b) Aromatic hydrocarbon c) Dickman reaction. Baeyer-Strain Theory and Sache Mohr Theory. Ring opening reaction with H_2 and HI

4. Alkenes, Dienes and Alkynes : 08

4.1 Alkenes

Introduction,Preparation methods:

a) But-1-ene from 1-butyne, b) But-2-ene from n-butyl alcohol and sec-butyl alcohol. Chemical Reactions: (with mechanism)

a) Electrophilic addition of Br_2 to ethene

b) Free radical addition of HBr to propene. (Peroxide effect)

c) Reaction of propene with Cl_2/ H_2O (Chlorohydrin formation)

d) Oxymercuration-Demercuration reaction

(Conversion of 3, 3-dimethyl-1-butene to 3, 3-dimethyl-2-butanol)

e) Cis-hydroxylation using alkaline $KMnO_4$.

4.2 Dienes

Introduction and classification

Resonance structure and molecular orbital picture of 1, 3-butadiene

Preparation methods of 1, 3-butadiene from-
a)1, 4-dibromobutane
b)1,4-butanediol.
Chemical Reactions:
a) Addition of Br_2 and HBr to 1,3-butadiene

b) Addition of ethene to 1,3-butadiene (Diel's-Alder reaction)

4.3 Alkynes

Preparation of ethyne (Acetylene) from a) Iodoform
b) Hydrolysis of calcium carbide Chemical Reactions (With Mechanism): Electrophilic addition of ethynewith HBrand Br_2

Unit-III

5. Alcohols and Epoxides 05

5.1 Alcohols

Introduction and Classification.

i) Dihydric alcohols: (Ethylene Glycol)

Nomenclature,
Preparation methods:
a) Hydroxylation of alkene b) 1, 2-dihaloalkanes. Chemical reactions:
Reaction with hydrogen chloride (HCl)

Oxidation with lead tetra acetate [$Pb(OCOCH_3)_4$]
Dehydration of ethane-1, 2-diol using P_2O_5 / $ZnCl_2$
ii)Trihydricalcohols : (Glycerol)
Nomenclature, Preparation methods from a) Fats and oils b) Propene

Chemical reactions :

a) Reaction with nitric acid b) Reaction with hydroiodic acid c) Reaction with acetyl chloride

5.2 Epoxides

Introduction and nomenclature

Preparation Methods :

a) Oxidation of ethene in the presence of silver catalyst b) Oxidation of ethene with peracetic acid

Chemical reactions :

Ring opening reaction of epoxides (propylene oxide): by acidic reagent and basic

Reagent.Reaction of epoxyethane with CH_3-Mg-I and CH_3-Li.

Part –II

Inorganic chemistry

Unit –IV

1 Periodic Table and Periodic Properties: 10P

A] Periodic Table:

Modern periodic law, Long form of the periodic table, Sketch, Cause of periodicity, Division of elements in to s, p, d, and f blocks. General characteristics of s, p, d and f block elements.

B] Periodic properties:

a) Atomic and Ionic size: Definition and explanation of atomic radius, ionic radius, Covalent radius, Vander waals radius. Variation of atomic size along a period and in a group.

b) Ionization Energy: Definition and Explanation, Successive ionization energy, Factors affecting ionization energy. Variation of ionization energy along a period and in a group.Applications of ionization energy to chemical behavior of an element.

c) Electron Affinity: Definition and Explanation, Successive electron affinity, Factors affecting electron affinity. Variation of electron affinity along a period and in a group.Applications of electron affinity to chemical behavior of an element. Difference between ionizationenergy and electron affinity.

d) Electronegativity: Definition and Explanation, Factors affecting electronegativity. Variation of electronegativity along a period and in a group.Pauling's approach of electronegativity. Calculations of electronegativity by Pauling's method (Numerical), Mulliken's approach. Applications of electronegativity to bond properties such as percent ioniccharacter, bond length, bond angle.

Unit- V

Noble Gas Chemistry: 05

a) Position in the Periodic table b)
Electronic configuration

c) Compounds of inert gases, under excited condition, through coordination, by physical trapping (Clathrates**).**

d) Fluorides of xenon : XeF_2, XeF_4 and XeF_6 preparation, properties and structures.

Reference:

1. A New Pattern Text Book of Organic Chemistry for Competition: O.P.Tandon andA.K.Virmani (G.R.Bathla& Sons Publication) 2009 Edition
2. Chemistry for Degree Students: R.L.Madan (S.Chand Publication) 2010 Edition
3. A Textbook of Organic Chemistry: ArunBahl and B.S. Bahl (S.Chand Publication) 2011

Revised Colour Edition.

4. Organic chemistry: S M Mukherji and S P Singh, (New Age International Publication) vol.I, Second edition, 2010.
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6. Organic Chemistry byRobert Thornton Morrison and Robert Neilson Boyd

7. A Guide book to mechanism on Organic Chemistry: Peter Sykes.

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B. Sc. First Year (Semester-I)
Paper-II: (CCC-I, Section-B)
Physical + Inorganic Chemistry

Credits:02 **Periods: 45**

Unit-I

Part - I
(Physical Chemistry)

A)Mathematical concept and SI Units: **07P**

Mathematical concepts

1.1 Logarithm: - Rules of logarithm, Characteristic and mantissa, Change of sign and base, Numerical problems.

1.2 Definition of pH and pOH, Relation between pH and POH, Numerical Problems based on pH and pOH.

1.3 Graphical representation of equations: - Rules for drawing graph, coordinates etc., Equation of straight lines, slope and intercept, plotting the graph from the data of chemical properties and Numerical Problems.

1.4 Derivative: - Rules of differentiation, partial differentiation, Algebraic, logarithmic and exponential functions. Numerical Problems.

1.5 Integration: - Rules of integration, Algebraic and exponential functions.Numerical Problems.

1.6 Permutation an combinations, Probability, Numerical Problems.

B) Physical quantities and their dimensions

1.7 International systems of units, derived units, subsidiary units, prefixes used in SI units, internal conversions of these units.

Unit-II

Surface Chemistry **06P**

2.1 Introduction, Adsorption, mechanism of adsorption, factors affecting adsorption, difference between adsorption and absorption.

2.2 Types of adsorption: Physical adsorption and chemical adsorption.

2.3 Adsorption of gaseous by solids.

2.4 Types of adsorption isotherm: i) Freundlich adsorption isotherm ii) Langmuir adsorption isotherm (Derivation).

Unit-III

Gaseous State: 10P

3.1 Introduction to Postulates of kinetic theory of gases, Ideal and non- ideal gases, Deviation of gases from Ideal behavior and Compressibility factor (Z).

3.2 Derivation of kinetic gas equation, Van der waals' equation of state , Units for Van der waals' constants, Interpretation of deviations from Van der Waals' equation.

3.3 Critical phenomenon-The P-V isotherms of Carbon dioxide, application of Van der Waals' equation to the isotherms of Carbon dioxide, relation between critical constants and Van der Waals' constants. Liquifaction of gases, Claude's method.

3.4 Molecular velocities-Root mean square, average and most probable velocities, qualitative discussion of the Maxwell's distribution of molecular velocities, collision number, mean free path and collision diameter.

3.5 Numericals on Van der Walls' constants and Critical constants, Root mean velocities.

Unit-IV

Solid state: 07P

4.1 Introduction to space lattice, Unit Cell, Characteristics of solids

4.2 Laws of crystallography: (i) Law of constancy of interfacial angles, (ii) Law of symmetry, Symmetry elements in crystals and (iii) Law of rational indices, Weiss indices and Miller indices,
Determination of Miller indices.

4.3 Cubic lattice and types of cubic lattice, planes or faces of a simple cubic system, spacing of lattice planes.

4.4 Diffraction of X-rays: Derivation of Bragg's equation. Experimental methods, rotating crystal and powder method.

4.5 Determination of crystal structure of NaCl and KCl on the basis of Bragg's equation.

4.6 Numericals on Miller indices and Bragg's equation.

Part II
Inorganic Chemistry

UNIT - V

A)

S-Block elements **10**

General characteristics of S-block elements

Variation in properties of S-block elements, atomic radii , ionization potential, colour of flame, reducing property and metallic property, diagonal relationship between Li and Mg, Points of difference between Li and other alkali metals. General study of hydrides of IA and IIA group. General studies of Oxides IA and IIA group, Basic strength of hydroxides of alkali and alkaline earth metals , Carbonates and bicarbonates of alkali and alkaline earth metals.

Complexes of alkali metals with salicylaldehyde ,acetylacetone. wrap around complexes with polydentate ligand such as crown ether and cryptate. Complexes of alkaline earth metals such as beryllium oxalate ion, chlorophyll and complex of calcium with EDTA.

B)

Oxidation and reduction: **05**

Definition of oxidation, Reduction, Oxidizing agent and reducing agents according to classical concept , electronic concept, oxidation number concept. Rules for assigning oxidation number, Balancing of redox reaction by

1) Ion-electron method and

2) Oxidation number method

Reference Books:-

1. Mathematical preparation for physical Chemistry .By F. Daniel, Mc. Graw Hill publication.

2 .University General Chemistry. By C.N. R. Rao Mc. Millan Publication.

3. Principles of Physical Chemistry. By Maron and Pruton 4th Ed. Oxford and IBH publication.

4 .Physical Chemistry.By G.M. Barrow.

5. Essentials of Physical Chemistry .By B. S. Bahl, G. D. Tuli, ArunBahl (S. Chand and Co Ltd.) (25th edition)

6 .Elements of Physical Chemistry.By S. Glasstone and D. Lewis (The Macmillan Press Ltd.)

7 .Physical Chemistry. By Robert A. Alberty(John Willey and Sons)

8. Principles of Physical Chemistry. By Puri– Sharma.

9. The Elements of Physical Chemistry .By P. W. Atkins

10 .Advanced Physical Chemistry.By Harish Gurudeep.

11 .Principles of Inorganic chemistry by Puri, Sharma and Kalia.

12. Advanced inorganic chemistry by Gurudeep Raj and ChatwalAnand.

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16 .Inorganic Chemistry by G. L. Miessler and D. A. Tarr.

17. Chemistry for Degree Students ,B.Sc F.Y by Dr. R.L. Madan(S. Chand)

B. Sc. First Year (Semester-II)
Paper-III [CCC-II, Section-A]
Organic + Inorganic Chemistry

Credits: 02

Part –A
Organic Chemistry **Periods: 45**

Unit-I

1. Aromatic Hydrocarbons and Aromaticity **10**

Source, Nomenclature, isomerism of aromatic compounds.Structure of benzene, stability, orbital picture of benzene.Aromaticityand anti-aromaticity byHuckel's Rule (Benzene, Naphthhalene,Anthracene, Pyrrole, Furan,Thiophene, Pyridine, Cyclobutadiene, Cyclopentadienylcation and anion).

Mechanism of electrophilic aromatic substitution of benzene: Nitration, halogenation, Birch reduction, Friedal Craft alkylation and acylation.

Orientation : Effect of Activatingand Deactivating Groups (-OH, $-NO_2$, $-CH_3$,Cl groups)On Aromatic Electrophilic (Nitration) substitution reaction (with mechanism)

Unit -II

2. Phenols **06**

Introduction,Classification,

Acidic character (Comparison of acidity : phenol and ethanol) Chemical Reactions :

Reimer-Tiemann reaction(Mechanism), Acetylation (mechanism), Fries rearrangement(Mechanism), Lederer-Manase reaction, Kolbe's Carboxylation reaction (Mechanism),Hauben-Hoesch reaction.

3. Haloalkene and Haloarene **08**

Haloalkene

A] Vinyl Chloride:

Synthesis of vinyl chloride from 1) 1, 2-Dichoroethane 2) Ethene 3) Ethyne

Chemical Reactions :

Resonance structure of vinyl chloride

Addition reaction with Br_2 and HBr, polymerization reaction.

B] Allyl Iodide:

Synthesis of allyl iodide from (a) allyl chloride (Finkalstein reaction) (b) glycerol and HI.

Chemical Reaactions :

Reaction with NaOH, KCN, NH_3, $AgNO_2$ and Br_2.

Haloarene

Nomenclature,Synthesis of halobenzene from 1) Hunsdiecker reaction 2) Gatterman reaction 3) Balz-Schiemann reaction.

Chemical Reaactions: (with mechanism)

Ullmannbiaryl synthesis, Dows process (Reaction with NaOH)

Relative reactivity of alkyl halide v/s vinyl and aryl halide towards nucleophilic substitution.

Unit -III

3. Carboxylic Acid Derivatives **06**

A] Acid chlorides:(Acetyl chloride)

Introduction

Preparation Methods:

a) By the action of thionyl chloride on acetic acid.

b) By the action of phosphorus pentachloride on acetic acid.
Chemical Reactions:
a) Hydrolysis

b) Action with alcohol c)
Action with amines
d) Action with sodium acetate.

B] Acid anhydride : (acetic anhydride)

Introduction

Preparation Methods:

a) From acid halide and carboxylic acid..

b) From sodium acetate and acetyl chloride.

Chemical Reactions:

a) Hydrolysis

b) Action with alcohol c)
Action with amines
d) Action with benzene

C] Esters:(Ethyl acetate)

Preparation Methods:

a) From ethyl alcohol and acetic acid

b) From ethyl alcohol and acetyl chloride.
Chemical Reactions:
a) Alkaline hydrolysis.
b) Actionof amines
c) Reduction.

D] Amides: (Acetamide)

Preparation Methods:

a) By the action of ammonia on acid chloride.

b) By the action of ammonia on acetic anhydride.
Chemical Reactions:
a) Hydrolysis

b) Action of nitrous acid
c) Reduction
d) Action of Br_2 and NaOH.

Part -II
Inorganic chemistry

Unit IV

Study of P-block elements 05

Variation in properties : atomic radius, ionization energy, electron affinity, electronegativity , metallic character , melting and boiling point , oxidizing and reducing properties , Variation in acidic and basic character of hydroxides of P-block elements , diagonal relationship between B and Si .

Unit-V

Acids and Bases. 10P

Introduction, Arrhenius concept, Bronsted-Lowry concept, Lewis acids and bases concept Discuss briefly with suitable example.

Solvent system concept, Cady-Elsey concept, Lux-Flood concept and Usanovich concept for acids and bases.

Definition of Hard, Soft and borderline acids and bases with various example. Pearson's principle (SHAB Principle), theories of hardness and softness such as Electronic theory, pi-bonding theory and Pitzer's theory.

Application of SHAB Principle such as relative stability of compound, feasibility of chemical reaction.

Limitation of SHAB concept.

Reference:

1. A New Pattern Text Book of Organic Chemistry for Competition: O.P.Tandon and A.K.Virmani (G.R.Bathla& Sons Publication) 2009 Edition
2. Chemistry for Degree Students: R.L.Madan (S.Chand Publication) 2010 Edition
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B. Sc. First Year (Semester-II)
Paper-IV; (CCC-II, Section B)
Physical + Inorganic Chemistry

Credits : 02 **Periods:45**

Part -I
Physical Chemistry

Unit-I **10 P**

Atomic structure:

1.1 Introduction to Dalton's atomic theory, Rutherford's atomic model.

1.2 The nature of electro-magnetic radiations

1.3 Black body radiation, Planck's radiation law-Quantisation of energy Bohr's model of
1.4 hydrogen atom: Postulates, derivation for i) radius of an orbit ii) velocity of an electron,iii) energy of an electron and iv) energy difference of an electron in terms of wave number, Rydeberg's constant. Merits and demerits of Bohr's theory, origin of spectral series-Hydrogen spectrum.
Sommerfeld's extension of Bohr's theory and its limitations.
Arrangements of electrons in Orbits-Bohr-Bury Scheme.
Quantum numbers.

1.5 Electronic configuration of elements: Aufbau principle, Pauli's Exclusion
1.6 principle, Hund's rule of maximum multiplicity and screening rule.
1.7 Numerical problems.
1.8

Unit-II

Liquid State: - **06 P**

2.1 Introduction-Various intermolecular forces in liquids.
Surface tension of liquid, units of surface tension, effect of temperature on surface tension, determination of surface tension of liquids by stalagmometer method, numerical Problems.

2.2 Viscosity of liquid, units of viscosity, effect of temperature on viscosity, measurement of viscosity by Ostwald's method, numerical Problems.

2.3 Parachor and chemical constitution: Relation between parachor and surface tension, application of parachors in deciding structures.

2.4 Numerical Problems.

Unit-III

Colloidal State: **07 P**

3.1 Definition, Classification of colloidal systems.

3.2 Solids in liquids (Sols):-

3.2.1 Preparation of sols: Dispersion and Aggregation methods.

3.2.2 Properties of sols :Colour, optical, kinetic and electrical properties.

3.2.3 Stability of sols, protective action, Hardy-Schulze law, gold number.

3.3 Liquids in liquids (Emulsions):- Types of emulsions, preparation, Emulsifier.

3.4 Liquids in solids (Gels):- Classification, preparation and properties, Inhibition.

3.5 Applications of colloids.

Unit-IV

Catalysis: 07 P

4.1 Introduction to Catalyst and Catalysis.

Type of catalyst, positive and negative catalyst with examples.

4.2 Catalysis:-Type of catalysis, homogenous and heterogeneous catalysis with examples.

4.3 Autocatalysis- explanation with examples.

4.4 Characteristics of catalytic reactions.

4.5 Promoters: - Definition, example, explanation of promotion action.

4.6 Catalytic poisoning: - Definition, example, explanation of catalytic poisoning.

4.7 Acid – Base catalysis, General Acid-Base catalysis.

4.8 Enzyme catalysis, examples, mechanism of enzyme catalysis, characteristics of enzyme catalysis.

4.9 Applications of catalysis in industries.

Unit-V

Part –II

Inorganic Chemistry

A) Chemical Bonding-I 10P

1.1 Definition, Cause for chemical bonding, Types of chemical bonding.

1.2 ***Ionic Bonding****:* Definition and explanation, Factors affecting the formation of ionic bond, Energy charges in the formation of ionic bond, Lattice energy and Born-Haber cycle. Polarizing power andpolarisability andFajan's rule.

1.3 ***Covalent bonding*** *:* Definition and explanation, Sigma and pi-bond, Valence bond theory of covalent bonding and its limitations,

Percentage ionic character in covalent bond from dipole moment and electronegativity difference (Numericals).

1.4 ***Metallic bonding****:* Definition and explanation, Free electron theory of metallic bonding, Effects of metallic bonding on metallic properties.

1.5 ***Vander Waal's bonding****:* Definition and explanation, Types of Vander Waal's forces responsible for Vander waals bonding.

1.6 ***Hydrogen bonding****:* Definition and explanation, Types of hydrogen bonding and consequences of hydrogen bonding. Unique properties of water based on hydrogen bonding.

Importance of hydrogen bonding in sustaining life.

B) Chemical bonding-II **05P**

2.1 ***Concept of hybridization:*** Definition and explanation of dsp^2 hybridization by taking example of $[Ni(CN)_4]^{-2}$, sp^3d hybridization by taking example PCl_5, Sp^3d^2 hybridization by taking example SF_6. Sp^3d^3 hybridization by taking example IF_7.

2.2 ***VSEPR Theory:*** Postulates and explanation, Applications in explaining geometry and bond angle in molecules such as CH_4, NH_3, and H_2O. Limitations of VSEPR theory.

2.3 ***Molecular Orbital Theory:*** Basic principle of MOT, LCAO, Bonding and anti-bonding molecular orbital, Energy level diagram for molecular orbital. Rules for adding electrons in MO's, Bond order,

Molecular orbital diagram of homo nuclear diatomic molecules such as H_2, N_2, O_2, and Ne_2And CO.

Reference Books:-

1. Mathematical preparation for physical Chemistry .By F. Daniel, Mc. Graw Hill publication.

2 .University General Chemistry. By C.N. R. Rao Mc. Millan Publication.

3. Principles of Physical Chemistry. By Maron and Pruton 4th Ed. Oxford and IBH publication.

4 .Physical Chemistry.By G.M. Barrow.

5. Essentials of Physical Chemistry .By B. S. Bahl, G. D. Tuli, ArunBahl (S. Chand and Co Ltd.) (25th edition)

6 .Elements of Physical Chemistry.By S. Glasstone and D. Lewis (The Macmillan Press Ltd.)

7 .Physical Chemistry. By Robert A. Alberty(John Willey and Sons)

8. Principles of Physical Chemistry. By Puri– Sharma.

9. The Elements of Physical Chemistry .By P. W. Atkins

10 .Advanced Physical Chemistry.By Harish Gurudeep.

11 .Principles of Inorganic chemistry by Puri, Sharma and Kalia.

12. Advanced inorganic chemistry by Gurudeep Raj and ChatwalAnand.

13. Concise Inorganic Chemistry by J. D. Lee.

14. Basic Inorganic Chemistry by F. A. Cotton, G. Wilkinson and P. L. Gaus.

15 .Inorganic Chemistry by A. G. Sharp.

16 .Inorganic Chemistry by G. L. Miessler and D. A. Tarr.

17. Chemistry for Degree Students ,B.Sc F.Y by Dr. R.L. Madan(S. Chand)

B.Sc. First Year
Paper-V [CCCP-I]

credits: 04 **Periods : 120**

Note : At least Sixteen experiments should be taken.

A) Inorganic Chemistry

Identification of Two acidic and Two basic radicals by Semi-micro qualitative analysis technique.(Including interfering radicals). **(Any Six)**

1) At least eight mixtures of salt must be practiced.

2) Spot- tests (of each radical) are compulsory.

B) Organic Chemistry

I) Preparations **(Any Four)** :

a) Phthalimide from phthalic anhydride and urea.
b)Acetanilide from aniline.
c) Iodoform from acetone.

d) Phenyl – azo – β –naphthol from aniline. e) m-Dinitobenzene from nitrobenzene.
f) Phthalic anhydride from phthalic acid.

(Recrystallization and Melting point of product is compulsory)

II)Determination of Physical constant of Organic liquids **(Any four)**

Aniline, Ethanol, Toluene, Benzene, ortho and meta toluidines, Chlorobenzene and Nitrobenzene.

III)Demonstration on purification by -
a)Recrystalisation of Phthalic acid/Benzoic acid from hot water. b) Distillation of Ethyl alcohol.
c) Sublimation of Napthalene.

C) Physical Chemistry (Any Six)

1. Determination of the Viscosity of liquid by Ostwald's viscometer.

2. Determination of the Viscosity of two pure liquids A & B. Hence find the composition of the mixture of two liquids. (Density data of liquids, viscosity of water to be given).
[Any two liquids from : Acetone, Carbon terachloride, Chloroform, Ethyl alcohol, Benzyl alcohol, Ethylene glycol and n-propyl alcohol].

3. To determine the surface tension of a given liquid by stalagmometer method.

4. Determine the equivalent weight of magnesium by hydrogen displacement method using Eudiometer.

5. To study Kinetics of hydrolysis of ester in presence of mineral acid like HCl.

6. Preparation of As_2S_3 solution from As_2O_3 and compare the precipitation power of NaCl and $MgCl_2$.

7. To study distribution of benzoic acid between benzene and water.

8. To study critical solution temperature (CST) of phenol water system.

9. Determination of Heat of solution of KNO_3/NH_4Cl.

10. Determination of Heat of reaction of displacement of copper by zinc.

11. To study kinetics of cooling of hot water.

Reference Books :

1. Advanced practical Inorganic chemistry by Gurudeep Raj.

2. Experiments in Inorganic chemistry by Gurtu andKapoor.

3. Practical Organic chemistry by A.I. Vogel.

4. Experiments inGeneral chemistry by C.N.R. Rao and Agrawal East West Press.

5. Experiments in Physical chemistry by R.C. Das and Behere, Tata McGraw Hill.

6. Experimental Physical chemistry by F. Daniel and others (International Student Edition).

7. Systematic Experimental Physical chemistry by S.W. Rajbhoj and Dr. T.K. Chondhekar, Anjali Publication, Aurangabad.

8. Advanced practical physical chemistry by J.B. Jadhav (Goel Publishing house, Meerut).

9. Experiments in Chemistry by D.V. Jahagirdar.

10. A Textbook of quantitative Inorganic analysis by A.I. Vogel.

Swami Ramanand Teerth Marathwada University, Nanded
Vishnupuri, Nanded (M.S.)

Choice Based Credit System

(CBCS Pattern)

Syllabus

B. Sc I Year (Computer Science)

(CBCS Pattern)

Effective from Academic Year (2016-2017)

Syllabus of First Year

B.Sc. Computer Science/Information Technology (Optional)

Semester	Subject Code	Course Name	Contact Hours			Total Credits
			Lecture(L)	Tutorial(T)	Practical(P)	
Semester – I	BCSITO01	**Problem Solving Using Computers**	3	--	--	02
	BCSITO02	**Web Page Designing Through HTML**	3	--	--	02
Semester – II	BCSITO03	**Programming in C**	3	--	--	02
	BCSITO04	**Analysis of Algorithm & Data Structure**	3	--	--	02
	BCSITO05	**Computer LAB-I**	--	--	04	04
	BCSITO06	**Basic Mathematics (Audit Course)**	3	--	--	--
					Total	12

Evaluation Scheme

Theory/ Practical	Semester /Annual	Semester No.	Paper No.	Title of the Paper	Marks						Min. Lectures / Week
					MCQ	Internal	Experiment	Oral	Record Book	Total	
Theory	Semester	I	I	Problem Solving Using Computers	40	10	---	---	---	50	03
			II	Web Page Designing Through HTML	40	10	---	---	---	50	03
		II	III	Programming in C	40	10	---	---	---	50	03
			IV	Analysis of Algorithm & Data Structure	40	10	---	---	---	50	03
Practical	Annual	-	V	Computer LAB-I	---	---	75	15	10	100	03
	Annual	**I & II**		**Basic Mathematics (Audit Course)**	---	---	---	---	---	----	03
Total					160	40	75	15	10	300	---
Total Marks for Theory = 50+50+50+50 = **200**					Total Lectures / Week /Division for Theory = **06**						
Total Marks for Practical =50					Total Lectures / Week / Batch for Practical = **03**						
Total Marks for FY = 200+50 = 250					Minimum Lectures / Week for FY = **09**						
Computer LAB-I: Practical Based On **Papers II & III (HTML & C Programming)**											

Paper No–I

Problem Solving Using Computers

(Marks: 50 Periods: 40)

1. **Computer Fundamentals** (06 Periods)
   Introduction to Computers, Block diagram of Computer, Characteristics of Computers, I/O Devices, I/O ports.
2. **Problem Solving Aspects** (08 Periods)
   Introduction to Algorithm, Top Down Designing, Implementation of Algorithm, Analysis of Algorithm, Flowchart, Principals of Flowcharts, Flowcharts Symbols.
3. **Fundamentals of Algorithms** (06 Periods)
   Exchanging value of variables, counting numbers, Summation of set of numbers, Factorial computations, Fibonacci number, Reverse of Digits.
4. **Factoring Methods** (06 Periods)
   Finding square root of numbers, smallest divisor of integers, greatest common divisor, generation of prime numbers, prime factor.
5. **Array Techniques** (08 Periods)
   Introduction to Array, types of Array, Memory Representation of Array, Reverse of Array, Array counting, Finding maximum and minimum element from Array
6. **Searching & Sorting Techniques** (06 Periods)
   Searching Techniques, linear search, binary search, Sorting Techniques:-bubble sort, selection sort.

Text book: 1. How to Solve it by Computer , Dromy R.J
2. Data Structure by Lipschutz Shaum Series

Reference Book: 1. Computer Fundamental by Anita Goel
2. Fundamentals of Computer by Dr. Bichkar & Dr. Sontakke

Paper No–II

Web Page Designing Through HTML

(Marks: 50 Periods: 40)

1. **Introduction to Web and Website** (06 periods)
   Introduction to Internet, Application and importance of Internet, www, URL, Web Browsers, web server, objectives of website, basic interface design, developing a story board for website, Navigation and links within website, checklist for designing.

2. **Introduction to HTML** (06 periods)
   Introduction to HTML, Basic elements, List- ordered/ Numbered list, Unordered/ Bulleted list, Definition list, Nesting list, Linking HTML pages, linking to URL, Text Formatting, Text Alignment, Character Styles, Fonts and Font Sizes, Using colors for the Web, preformatted text, Horizontal line, line break, Displaying special characters.
3. **Images in HTML** (06 periods)
   Images in HTML pages, Embedding inline images and external images, images and text alignment, images and links, alternative tags for images, using image as background, displaying images with heights and width dimensions, images preview, image for the web, reducing file size of image file, decreasing the file size by reducing the colour depth of image file,
4. **Tables in HTML** (06 periods)
   Introduction to tables, Features of tables, Tables in HTML, components of table, creating table, table cell and border, table and cell color,
5. **Frames, Image Maps** (06 periods)
   Introduction to Frames, Creating frames, Frames attributes and linking of frames, complex framesets, Inline frames.
6. **Forms and CGI Scripts** (06 periods)
   Introduction to forms, form design, text input fields, radio buttons, check box buttons, and submit button, additional layout features (select tag, Text AREA tag, and Hidden fields)

Reference books:

1. Web Publishing by Mnica D' Souza, Jude D' Souza (TMH Publication)
2. The complete reference HTML & CSS by T.A. Powell (TMH Publication)
3. HTML, DHTML, JavaScript, Perl CGI by IVAN Bayroos (BPB Publication)

Paper- III

Programming in C

(Marks : 50 Periods : 40)

1. **Introduction to C** (05 periods)

Introduction, Character set, C tokens, Data types, Constant, Variables, declaration of storage class, Input/Output Statement, operators, Hierarchy of Operation, Structure of C program.

2. **The Decision and Looping, Control Structure** (08 periods)

If Statement, If-Else statement, Nesting of If-Else, else-if ladder, Switch Statement, Goto. While loop, Do-While loop, For loop.

3. **Arrays and Pointers** (05 periods)

Introduction to Array, One-dimensional arrays: Declaration & Initialization, Two-dimensional arrays: Declaration & Initialization, Multi-dimensional arrays

Introduction, understanding pointers, accessing address of variable, declaring pointer variables, initialization of pointer variable

4. **Storage Classes** (02 periods)

Automatic, Register, Static, Scope rules.

5. **Functions** (07 periods)

Introduction, Definition of function, return values and their types, function calls, function declaration, recursion, passing arrays to functions,What are string, Standard Library string functions: strlen(), strcpy(),strcmp(), strcat().

6. **Structure and Union** (09 periods)

Introduction, defining a structure , defining a structure variable, accessing structure members, initialization of structure, structure within structure, union, Introduction to File Handling.

Reference Books:

1. C programming by B. Gottfried, Schaum's outline series
2.Programming in ANSI C by E. Balaguruswamy, TATA MCGRAW Hill Publication.
3. Let US C by Yeshwant Kanetkar, BPB Publication.
4. Programming in ANSI and Turbo C by Prof. Kamthane, Pearson Education.

Paper No –IV

Analysis of Algorithm and Data Structure

(Marks : 50 Periods : 40)

1. **Role of Algorithms in Computing** (08 periods)
   Introduction, Algorithms as a technology, designing Algorithm, divide and conquer technique/ Approach
2. **Introduction to Data Structure** (08 periods)
   Introduction, Elementry data organization, data structure operations, mathematical notations and functions, Algorithmic notations, control structure.
3. **Linked List** (08 periods)
   Introduction, Representation of linked list in memory, Traversing, Searching, Unsorted link list, Inserting after given node, deleting node with a given item of information.
4. **Stack and Queue** (08 periods)
   Introduction, Memory representation of Stack, Insert element in Stack_PUSH, Delete element from Stack_POP.
   Queue: Introduction, Memory Representation, Insert & Delete operation.
5. **Trees** (08 periods)
   Introduction, Binary tree & it's Memory representation, Insertion & Deletion of nodes in binary tree, Threaded binary tree.
6. **Graphs** (08 periods)
   Introduction, Memory Representation of graphs, types of graphs, Warshall's Algorithm.

Text Book:

1. Data Structure by lipschtz
2. An Introduction to Data Structure with Application by Jean Paul
3. Introduction to Algorithms, Cormen Chatles E. Leiserson, PHI Edition.

Paper No. V
Laboratory Work based on Paper No. II & III

Marks 50

Practical's based on HTML & C Programming (Follow Lab Manual)

Basic Mathematics (Audit Course) Periods: 40

(Totally internal evaluation, and evaluation is done by Assigning, Tutorials / Home Assignments / Tests)

Unit –I

Binomial theorem: Introduction, Binomial Theorem for positive Integral Indices, general and middle terms, **Sequence and series:** Introduction to sequence and series,AP,GP,relationship between A.M and G.M, Sum to n terms of special series.

Unit –II

Limits and Derivatives: Introduction, Intuitive Idea of Derivatives, Limits, Limits of Trigonometric Functions, Derivatives

Differentiation: Definition: derivative, derivative at a point, geometrical significance of derivative, physical significance (velocity as a rate of change of displacement), derivatives from first principle - of trigonometric functions, logarithmic functions, algebraic functions, exponential functions, rules of differentiation – derivative of sum, difference, product and quotient.
Integration: Definition of integration as anti derivative, geometrical interpretation of indefinite integrals, algebra of integrals – integrals of some standard functions, rules of integration.

Unit –III

Unit- IV Determinants

Revision, determinant of order three,definition, expansion, properties of determinants, minors & co-factors,applications of determinants, condition of consistency, area of a triangle, Cramer'srule for system of equations in three variables.

Unit –V Matrices

Introduction, concepts, notations, order, types of matrices – zero matrix, row matrix, column matrix, square matrix, determinant of a square matrix, diagonal matrix, scalar matrix, identity matrix, triangular matrices, singular & non-singular matrices, transpose of a matrix, symmetric & skew symmetric

matrices, operations on matrices – equality, addition, subtraction, multiplication of a matrix by a scalar, simple properties, multiplication of matrices – definition, properties of matrix multiplication, properties of transpose of a matrix -(A')' = A, (KA)' = KA',(AB)' = B'A'

Unit –VI Permutations & combinations

Introduction, fundamental principle of counting, factorial notation, permutations, when all r objects are distinct, when all r objects are not distinct, circular permutations, simple applications, combinations – definition, properties, relations between permutations and combinations, simple applications.

Reference Book:

NCERT Books and Maharashtra State board standard text (Syllabus is based on 11^{th} and 12^{th} Mathematics)

***Note: This course is exempted if the student had passed the HSC with mathematics**

SWAMI RAMANAND TEERTH
MARATHWADA UNIVERSITY NANDED

CBCS PATTERN FOR

B.A./ B.Sc. MATHEMATICS

Credit Course Effective From June 2016

For B.A./B. Sc I Year

Semester	Section and Paper Code	Period per week	Paper No. and Title of the papers	Marks of Semester	Internal C.A.	Total Marks	Credits
I	CCM-1 Section A	4	Paper- I Differential Calculus	40	10	50	2
	CCM-1 Section B	4	Paper-II Algebra & Trigonometry	40	10	50	2
II	CCM-2 Section A	4	Paper –III Integral Calculus	40	10	50	2
	CCM-2 Section B	4	Paper- IV Geometry	40	10	50	2
Lab Course work (Annual Pattern Practical)	CCMP-1 Based on CCM-1&2	3	Paper -V Practical on MATLAB only for B.Sc. Students	80	20 (R.B.=10 V.V=10)	100	4
					Total Credits		12

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

CBCS PATTERN FOR B.A./ B.Sc. MATHEMATICS

Credit Course Effective From 2017-18

For B.A./B. Sc II Year

Semester	Section And Paper Code	Period per week	Paper No. and Title of the papers	Marks of Semester	Internal C.A.	Total Marks	Credits
III	CCM-3 Section A	4	Paper –VI Real Analysis - II	40	10	50	2
	CCM-3 Section B	4	Paper – VII Group Theory	40	10	50	2
	CCM-3 Section C	4	Paper –VIII Ordinary Differential Equations (NOTE:- This Paper is Only For B.Sc. Students.)	40	10	50	2
	SEC-I		Five skill out of which one Skill can be chosen		$15\times3=45$		2*
IV	CCM-4 Section A	4	Paper-IX Real Analysis–II	40	10	50	2
	CCM-4 Section B	4	Paper –X Ring Theory	40	10	50	2
	CCM-4 Section C	4	Paper XI Partial Differential Equation (NOTE:- This Paper is Only	40	10	50	2

			For B. Sc. Students)				
Lab Course work (Annual Pattern Practical)	CCMP-2 Based on CCM-3&4	3	Paper –XII Practical on MATLAB only for B.Sc. Students	80	20 (R.B.=10 V.V=10)	100	4
	SEC-II		Five skill out of which one Skill can be chosen		15×3=45		2*
					Total Credits		20

SWAMI RAMANAND TEERTH MARATHWADA

UNIVERSITY NANDED

CBCS PATTERN FOR B.A./ B.Sc. MATHEMATICS

Credit Course Effective From 2018-19

For B.A./B. Sc III Year

Semester	Section Paper Code	Period per week	Title of the papers	External and Internal Exam	Internal C.A.	Total Marks	Credits
V	DSEM-5 Section A	4	Metric Spaces	40	10	50	2
	DSEM-5 Section B	4	Linear Algebra	40	10	50	2
	DSEM-5 Section C	4	Choose any one of the Following Electives papers i) Topology ii) Number Theory iii) Operation Research iv) Introduction to Fuzzy logic	40	10	50	2
	SEC-III		Five skill out of which one Skill can be chosen		15×3= 45		2*
VI	DSEM-6 Section A	4	Numerical Analysis	40	10	50	2
	DSEM-6	4	Integral Transforms	40	10	50	2

	Section B						
	DSEM-6 Section C	4	Choose any one of the Following Electives papers i)) Complex Analysis ii)Discrete Mathematics iii) Mechanics iv)Fundamentals of applied Statistics	40	10	50	2
Lab Course work (Annual Pattern Practical)	DSEMP-3 Based on DSEM-5&6	3	Practical on MATLAB only for B.Sc. Students	80	20 (R.B.= 10 V.V=10)	100	4
	SEC-IV		Project Work	50			2*
					Total Credits		**20**

Swami Ramanand Teerth Marathwada University, Nanded (M.S.).

B.A./B.Sc. First Year

CBCS PATTERN FOR B.A./ B.Sc. MATHEMATICS

SEMESTER - I & II

Effective from June -2016

B.A/B.Sc. F.Y. Semester- I

(CBCS PATTERN)

Paper I (MT 101): Differential Calculus

(CCM-1(Section A) For 2 Credits)

(No. of periods: 60 Max. Marks:50)

Revision: Relation, Functions, Limit, Continuity, Differentiation, Derivatives of some standard functions, Some rules of Differentiation.

Unit I: Hyperbolic functions, Higher order derivatives, n^{th} order derivatives, Leibnitz theorem, Equation of tangent and normal, Angle of intersection of two curves, Length of tangent, normal, sub tangent and subnormal at any point of a curve.

Unit II: Rolle's theorem, Lagrange's mean value theorem, Meaning of sign of derivative, Cauchy's mean value theorem, Generalized mean value theorems (Taylor's theorem, Maclaurin's theorem), Expansions of some functions. Indeterminate forms: $0/0$, ∞/∞, $0.\infty$, $\infty-\infty$, 0^0, 1^∞, ∞^0.

Unit III: Functions of two variables, Neighborhood of a point (a,b), Limit & Continuity, Partial derivatives, Geometrical Interpretation, Homogeneous functions, Theorems on total differentials, Equality of $f_{xy}(a,b)$ & $f_{yx}(a,b)$, Equality of f_{xy} & f_{yx} , Taylors theorem for functions of two variables.

TEXT BOOK:

Shanti Narayan, "Differential Calculus" S. Chand & Co.

Scope: Unit I: 4.7, 5.1-5.5, 6.1-6.4.

Unit II: 7.1-7.7, 9.1-9.7.

Unit III : 10.1-10.9, A_1- A_3.

REFERENCES:

1) Differential calculus By shanty Narayan and P.K. Mittal ,S. Chand.
2) Text book on Differential Calculus", Gorakh Prasad ,Pothishala Private limited pub.
3) Calculus , Schaum's outline series By Ayres F.Mc Graw Hill,1981
4) Differential calculus By Edwards J., Mac Millan and Co. Ltd.
5) Introduction to Calculus by Green Span D. , Harper&Row
6) Lectures on Calculus and Differential Equations By T M Karadeand M S Bendre, Sonu Nilu Bandu ,Nagpur.
7) Theory and Problems on Advance Calculus , Murray and R.. Spiegel , Schaum Pub. Co. New York .
8) Advanced Calculus, G.P. Shrivastav, Hari Kishan, Nagendra Kumar, Ram Prasad and sons pub.

B.A/B.Sc. F.Y. Semester- I
(CBCS PATTERN)
Paper II (MT 102): Algebra and Trigonometry
((CCM-1,(Section B) , For 2 Credits))
(No. of periods: 60 Max.Marks:50)

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Unit I : Matrices : Matrix, Different Types of Matrices, Equality of Matrices, Addition (Sum) of Two Matrices, Properties of Matrix Addition, Subtraction of Two Matrices, Multiplication of a Matrix by a Scalar, Properties of Multiplication of a Matrix by a Scalar, Multiplication of Two Matrices, Properties of Matrix Multiplication, Positive Integral Powers of a Matrix, Transpose of a Matrix, Conjugate of a Matrix, Transposed Conjugate of a Matrix, Determinant of a Square Matrix, Minor of an Element, Co-factor of an Element, Adjoint of a Square Matrix, Inverse of a Square Matrix, Singular and Non-singular Matrix, Orthogonal Matrices, The Determinant of an Orthogonal Matrix, Unitary Matrix.

Unit II : Rank of a Matrix and Linear Equations : Minor of Order k of a Matrix, Rank of a Matrix, Elementary Row and Column Operations, Elementary Operations, The Inverse of an Elementary Operation, Row and Column Equivalent, Equivalent Matrices, Working Procedure for Finding Rank Using Elementary Operations, Row-Echelon Matrix, Row Rank and Column Rank of a Matrix, Linear Equations, Equivalent Systems, System of Homogeneous Equations.

Characteristic Roots and Characteristic Vectors : Definitions, To Find Characteristic Vectors, Cayley-Hamilton Theorem (Statement Only)

Unit III : Trigonometry : Complex Quantities, DeMoivre's Theorem, Expansions of sin $n\theta$ and cos $n\theta$, Expansions of the sine and cosine of an Angle in Series of Ascending Powers of the Angle, Expansions of the sines and cosines of Multiple Angles, and of Powers of sines and cosines, Exponential Series for Complex Quantities, Circular Functions for Complex Angles, Hyperbolic Functions, Inverse Circular Functions, Inverse Hyperbolic Functions.

TEXT BOOK :

Topics in Algebra By Om P. Chug, Kulbhushan Prakash, A.D.Gupta,
Anmol Publications Pvt. Ltd., New Delhi (First Edition 1997)

Scope : Unit I : Chapter 10 : 10.1 to 10.17 (10.13, 10.15, 10.17 Only Statements), 10.20 to 10.22,10.27 to 10.32, 10.34 to 39 (10.39 Only Statements)

Unit II : Chapter 11 : Art 11.1, 11.2, 11.5 to 11.16, 11.32 to 11.39
Chapter 12 : Art 12.1 to 12.3, 12.18 (Only Statement)

Text Book : 2. Plane Trigonometry Part II By S.L.Loney,
A.I.T.B.S. Publishers and Distributors, Delhi (Reprint 2003)

Scope : Unit III : Art. 17, 18 19, 21, 22, 27, 32, 33, 42, 43, 44, 45, 46, 47, 56, 57, 58, 59, 60, 61, 62, 63, 67, 68, 69, 71, 73, 74, 76, 77, 79.

REFERENCES :

1. A Text Book of Matrices By Shanti Narayan (S.Chand & Company Ltd., New Delhi)
2. Matrices By A.R.Vasishtha (Krishna Prakashan Media (P) Ltd., Meerut)
3. First Course in Linear Algebra by P.B.Bhattacharya, S.K.Jain, S.R.Nagpaul (New Age International (P) Limited Publishers)

4. Elementary Topics in Algebra By K. Khurana and S.B. Malik. (Vikas Publishing House Pvt. Ltd., New Delhi.)
5. Higher Trigonometry B. C. Das, B. N. Mukherjee, By (U.N.Dhur & Sons Private Ltd. Kolkata)
6. Arihant Trigonometry, Amit M. Agrawal (Arihant Publication Pvt. Ltd).
7. Lectures on Algebra and Trigonometry By T M Karade and M S Bendre, Sonu Nilu Bandu ,Nagpur.
8. Text Book on Trigonometry By R S Verma and K. S. Shukl;a,, Pothishala Private limited pub.
9. Elementry Matrix Algebra By Hohn Franz E, Amerind Pub. Co. Pvt. Ltd.
10. Text Book on Algebra and Theory Of Equations By Chandrika Prasad, Pothishala Private limited pub.

B.A/B.Sc. F.Y. Semester- II
(CBCS PATTERN)
Paper III (MT 103): Integral Calculus
(CCM-2,(Section A) , For 2 Credits)
(No. of periods: 60 Max. Marks:50)

Unit I : Integration, Definition, Standard Forms,

Methods of Integration, Integral of product of two functions, Reduction formulae, Integral of rational fractions, Partial fractions, Non-repeated linear factors, Repeated factors, Integration of Irrational Algebraic fractions, A rational function of a root of a linear expression and x, Integration of $x^m(a + b^n)^p$, Reduction formulae for $\int x^m \left(a+b^n\right)^p dx$.

Unit II : Integration of Transcendental Functions :

Integration of $\sin^m x$, $\cos^n x$, reduction formulae for $\int \sin^n x dx$, reduction formulae for $\int \sin^m x \cos^n x dx$, Integration of $\tan^n x$ and $\cot^n x$, Integration of $\sec^n x$ and $\text{cosec}^n x$, Integration of $x^n \sin mx$ or $x^n \cos mx$,

Definite Integrals : Definitions, General properties of the definite integrals, The integral as the limit of a sum, Areas

Unit III : Areas of Curves :

Areas of curve given by Cartesian equations, Areas of curves given by polar equations. Multiple Integrals : Double integrals, Evaluation of double integrals, Area by double integration, Volume under a surface, Triple integrals, Gamma function, Definition, An important property, Product of two single integrals, Value of $\Gamma(1/2)$, Integral of $\sin^{2m-1}x \cos^{2n-1}x$, Beta function, Dirichlet's integral

TEXT BOOK :

Integral Calculus, by Gorakh Prasad, Pothishala Private Limited, 2, Lajpat Road, Allahabad-211002

Scope :

Unit I :

Chapter 1 : 1.10, 1,11, 1.13, 1.3, 1.35, 1.37
Chapter 2 : 2.1, 2.2, 2.3
Chapter 3 : 3.1, 3.8, 3.81

Unit II :

Chapter 4 : 4.1, 4.11, 4.12, 4.2, 4.21, 4.4
Chapter 5 : 5.1, 5.2, 5.3, 5.4, 5.5

Unit III :

Chapter 7 : 7.1, 7.2
Chapter 10 : 10.1, 10.2, 10.3, 10.31, 10.7
Chapter 11 : 11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7

REFERENCES :

[1] *Mathematical Analysis By S.C.Malik &Savita Arora (Second revised edition)*.

[2]*Advanced Calculus* by Spiegel M. R., Schaum's Outline Series, McGraw Hill Book Company.

[3] *Calculus A Complete Course* by Robert A. Adams, Pearson Addition Wesley, Toronto.

[4] *Calculus Volumes I, II* by Apostol T. M., Wiley.

[5] *Differential and Integral Calculus Volumes I , II* by N. Piskunov, G. K. Publishers, Noida

[6] Integral calculus by Shanti Narayan and P.K.Mittal,S.Chand and Comp.Ltd.

[7]Advanced Integral calculus by J.K.Goyal and K.P.Gupta,Pragati Prakashan,Meerut.

[8] Integral calculus by U.P.Singh,R.J.Srivastave and N.H.Siddiqui,Dominant Publishers and Distributors New Delhi-110002.

[9] Problems in Mathematical Analysis III: Integration, Kaczor, W.J., Nowak, M.T., University Press.

B.A/B.Sc. F.Y. Semester- II
(CBCS PATTERN)
Paper IV (MT 104): Geometry
(CCM-2, (Section B), For 2 Credits)

(No. of periods: 60 Max.Marks:50)

Unit I : Co-ordinates : Direction cosines of a line, a useful relation, relation between direction cosines, Projection on a straight line, projection of a point on a line, projection of a segment on another line, projection of a broken line, projection of the join of two lines. angle between two lines.

The Plane : Theorem , converse of the preceding theorem, Transformation to the normal form, direction cosines of the normal to a plane, angle between two planes, determination of plane under given conditions, intercept form of the equation of a plane, plane through three

points, system of planes, two sides of a plane, length of perpendicular from a point to a plane, bisectors of angle between two planes.

Unit II : Right line : Representation of line, equation of line through a given point drawn in a given direction, equation of a line through two points, two forms of the equation of line, Transformation from the unsymmetrical to the symmetrical form, angle between a line and a plane, condition for a line to lie in a plane, coplanar lines, condition for coplanarity of lines, Number of arbitrary constants in the equation of straight line, determination of lines satisfying given conditions, the shortest distance between two lines, length of the perpendicular from a point to a line.

Transformation of Co-ordinates: Introduction , change of origin, change of the direction of a axes, relation between direction cosines of three mutual perpendicular lines.

Unit III : The Sphere: Definition, equation of sphere, General equation of a sphere, The sphere through four given points, sphere, plane section of a sphere, intersection of two spheres, sphere with a given diameter, equation of a circle, sphere through a given circle, intersection of a sphere and a line, Power of a point, equation of a tangent plane, plane of contact, the polar plane , pole of plane, some results concerning poles and polars, angle of intersection of two spheres, condition for the orthogonally of two spheres.

Cones, Cylinders: Definition, equation of a cone with a conic as a guiding curve, The right circular cone, definition, the cylinder, equation of a cylinder, the right circular cylinder, definition.

TEXT BOOK :

Analytical Solid Geometry, By Shanti Narayan and Dr. P.K. Mittal

(S. Chand Publication.)

Scope : Unit I : Chapter 1 : Art. 1.6, to 1.8

Chapter 2 : Art. 2.1 to 2.7

Unit II : Chapter 3 : Art. 3.1 to 3.7.

Chapter 5 : Art. 5.1 to 5.2

Unit III : Chapter 6 : Art. 6.1 to 6.7.

Chapter 7 : Art. 7.1, 7.1.1, 7.6,7.6.1, 7.7, 7.7.1,7.8,7.8.1.

REFERENCES

1) Analytical Geometry of two and three dimentions, By Quiz Zameeruddin: Narsoba Pub.

2) Text Book on coordinate Geometry, By Gorakh Prasad, H.C. Gupta; Pothishala Pub.

3) Lecturers on Vector Analysis and Geometry, By T.M. Karde and M.S. Bendre.

4) Analytical Geometry of Three dimensions ,By N. Saran and R.S. Gupta , Pothishala Pub.

5) A Text Book of Analytical Geometry of Three dimensions, By P. K. Jain and Khalil Ahmad ,Wiley Eastern Ltd.

6) Elementary Treatise on Co-ordinate geometry of three Dimensions By R.J.T. Bell, Mac Millan India Ltd.

B.Sc. F.Y. PRACTICAL PAPER

(Annual pattern)

WITH EFFETIVE FROM June 2016.

CBCS PATTERN

PAPER V: (MP105): PRACTICAL PAPER:

(CCMP-1, Based on CCM-1 and 2 , For 4 Credits) (No. Of

(Periods per Batch 2 per week , max . marks 100)

SOFTWARES: MATLAB or Related Freeware.

N.B.: PRACTICAL PAPER IS ONLY FOR B.Sc. Students.

Section 1: Introduction to MATLAB: MATLAB Programming language, Built-in Functions, Graphics, computations, External interface and Tool boxes. Basics of MATLAB: MATLAB windows, desktop, command window, workspace, Figure and Editor Windows, Input-output, File types, platform dependence, Printing. Programming in MATLAB: Scripts and

functions. Script files, function files: Executing of function, writing good functions, sub functions, compiled
functions.

Section 2: Interactive computation :- (MATRICES) Matrices and Vectors, input, indexing, matrix manipulation, creating vectors. Matrix and Array operations, Arithmetic operations, Relational operations, logical operations, Elementary math functions, matrix functions, character
string. Command line Functions, Inline functions, Anonymous functions .Built-in functions, finding the determinant of matrix, finding eigen-values and eigenvectors.

Saving and loading Data, Importing data files, recording a session. Applications: - Linear Algebra. Solving a linear system, Gaussian elimination, Finding eigenvalues and eigenvectors, matrix factorization, advanced topics.

Section 3: Plotting of Graphs: - Plotting simple Graphs. Graphics: - Plotting of 2D graphs, Using subplot for multiple graphs, 3DPlots (Drawing of different Geometrical objects), saving and Printing.

Reference Book: (for MATLAB Users).

1. Getting Started With MATLAB 7. Rudra Pratap, Oxford University Press, (Indian Eden)www.oup.com, ISBN-0-19-568001-45

Scope Chapter 1: Art. 1.1,1.6. Chapter 3: art 3.1, 3.2, 3.4, 3.5, 3.6, 3.7,
Chapter 4: 4.1, 4.2
Chapter 5: Art. 5.1
Chapter 6: Art 6.1, 6.2, 6.3.

NOTE: 1) Section 1 is introductory part, so no question to be set for Examination.

2) Record book must contain 10 practical on section 2 and 10 Practical on section 3.

B.Sc. F.Y. PRACTICAL PAPER

(Annual pattern)

WITH EFFETIVE FROM June 2016

(LIST OF PRACTICALS)

N.B.: PRACTICAL PAPER IS ONLY FOR B.Sc. Students

Any twenty of the following practical problems :

1) To enter the Matrix A and pick-out following entries from it : A_{11}, A_{21}, A_{22}, A_{23}.
2) To find the transpose a matrix.
3) For two matrices A and B, to find $A + B$ & $B + A$ and to verify whether the matrix addition is commutative.

4) For a square matrix A to find A^2, A^3, A^4, A^5.
5) For two matrices A and B, confirmable for multiplication from both sides, to find AB and BA.
6) To verify the associativity of matrix addition.
7) To verify both left distributive law and right distributive law.
8) To find the determinant of a square matrix.
9) To find the inverse of a square matrix.
10) To find the rank of the matrices.
11) To solve the system of linear equations whose matrix equation is $Ax = b$ and check the solution.
12) To find the eigen values of a square matrix.
13) To find the eigen vectors of a square matrix.
14) To find the characteristic polynomial of a square matrix.
15) To find the conjugate a matrix.
16) To plot $f(x) = e^{\frac{-x}{10}} \sin x$ for x between 0 and 20.
17) To plot $r(\theta) = 1 + 2\sin^2(2\theta)$ for $0 < \theta < 2\pi$.
18) To plot the contours of $z = \cos x \cos y \exp\left(-\sqrt{x^2 + y^2 / 4}\right)$ over the default domains.
19) To plot the surface for $z = \frac{-5}{\left(1 + x^2 + y^2\right)}$ over the domain $| x | < 3$ and $| y | < 3$.
20) To plot multiple graphs $y_1 = \sin t$, $y_2 = t$, $y_3 = 1 - \frac{t^3}{3!} + \frac{t^5}{5!}$ in same figure window.
21) To plot $x = e^{-t}$, $y = t$, $0 \le t \le 2\pi$.
22) To plot $f(t) = t \sin t$, $0 \le t \le 10\pi$.
23) To plot the surface $z = \frac{xy\left(x^2 - y^2\right)}{x^2 + y^2}$, $-3 \le x \le 3$, . $-3 \le y \le 3$ by computing the values of z over 50 x 50 grid on specified domain.
24) To draw a cylinder with base radius $r = 40$ and top radius $r = 60$
25) To plot the unit sphere.
26) To draw discrete data plot with stems : $x = t$, $y = t \sin(t)$, $z = e^{\frac{t}{10}} - 1$ for $0 \le t \le 6\pi$.
27) To draw the MATLAB logo ($z = \cos x \cdot \cos y \cdot e^{\frac{-\sqrt{x^2+y^2}}{4}}$ for $| x | \le 5$, $| y | \le 5$).
28) To draw the pie chart for the world population by continents for data.
29) To draw the bar chart for the world population by continents for data.
30) To plot $x = t$, $y = e^t$, $0 \le t \le 2\pi$.

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SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

SEMESTER PATTERN CURRICULUM UNDER

CHOICE BASED CREDIT SYSTEM (CBCS) FOR

Faculty of Science

Under Graduate (UG) Program

SUBJECT: PHYSICS

(w. e. f. Academic Year 2016-2017)

Salient Features of B. Sc. Physics (CBCS) Curriculum

Several initiatives have been taken by the SRTM University, Nanded time to time to upgrade and enhance the academic excellence, examination reforms and developing the skilled minds and skilled hands. The semester and CGPA pattern has been adopted in 2014. Now the university is going one step ahead to adopt and implement the Choice Based Credit System (CBCS) semester pattern to Undergraduate program run by various colleges affiliated SRTM University, Nanded. As per the initiatives led by University the syllabi of B. Sc. Physics (CBCS Semester Pattern) has been finalized and effectively implemented from academic year June, 2016. The Syllabi is framed as per the guidelines given in the UGC and SRTMU CBCS Semester pattern. The numbers of objectives are taken in to consideration while reforming the syllabi.

The main objective is to create skilled minds and therefore understanding of theoretical and mathematical knowledge essential for finding solutions of various interacting physical phenomenon, the full paper on mathematical methods in physics is included. It helps in general to improve scientific attitude to solve the research oriented problems, problems of interacting systems. The introduction of Sci Lab is introduced in the practical course work to upgrade the computer knowledge and develop the skill to solve the various mathematical problems.

The professional Education of the students begins while enrolling their names in the B. Sc. Classes. The Board of study thought authentically that some sort of Job oriented syllabi is to be included and accordingly, some principles of cooling and liquification of gasses, some part of thermodynamics, theoretical physics, AC current, part of industrial electronics, digital electronics, communication system, TV, Lasers, detectors, nuclear energy, solar energy and various aspects of physics related to the industries and research field has been covered. The lab work also includes theory based practical to develop the

skill and create interest of the students in the subject physics. To enhance the students knowledge and create the skill among them some sort of skill courses has been introduce as per the initiatives taken by the UGC. The number of Elective papers has been included in semester fifth and sixth for upgrading interest status and to giving broad choice to the interesting students.

The CBCS Structure of B. Sc. Curriculum in subject Physics and B. Sc. First Year Physics syllabus has been finalized unanimously in the BOS physics Meeting held on 12/4/2016 at SRTM University Nanded as per the University initiatives.

Chairman BOS Physics SRTM University Nanded

Dr. L. S. Ravangave

Distribution of credits for B.Sc. Physics (optional)
Under Faculty of Science
B. Sc. Syllabus structure
Semester Pattern effective from June 2016
Subject: Physics

CLASS: B. Sc. First YEAR

Semester I&II

Semester	Paper No.	Name of the Course	Instruction Hrs/	Total period	ESE	C. A.	Total Marks	Credits
I	CCP I (Section A)	Mechanics and Properties of Matter (P-I))	03	45	40	10	50	2
	CCP I (Section B)	Mathematical Methods in Physics (P-II)	03	45	40	10	50	2
II	CCP II (Section A)	Heat and Thermodynamics (P-III)	03	45	40	10	50	2
	CCP II (Section B)	Electricity and Magnetism (P-IV)	03	45	40	10	50	2
	CCP P I	P-V :Practical's based on Section A & Section B of CCP-I & CCP-II	04	15 Practical	80	20	100	4
	Total credits semester I and II: 12							

ESE: End of Semester Marks C. A.: Continuous Assessment (Internal)

CLASS: B. Sc. SECOND YEAR

Semester III& IV

Semester	Paper No.	Name of the Course	Instruction Hrs/ week	Total period	ESE	C. A.	Total Marks	Credits
III	CCPIII (Section A)	Waves and Oscillations (P-VI)	03	45	40	10	50	2
	CCP III (Section B)	Statistical physics, Electromagnetic Theory and Relativity (P-	03	45	40	10	50	2
	CCPP II (Annual Pattern Section A)]	P-X: Practical's based on P-VI & P-VIII	04		40	10	50	2
	CCP II (Section B)	SEC I (1 Skill/ optional)			-	15×3 = 45	-	(02)*
IV	CCP IV (Section A)	Basic Electronics (P-VIII)	03	45	40	10	50	2
	CCPIV (Section B)	Optics and Lasers (P-IX)	03	45	40	10	50	2
	CCPP III (Annual Pattern Section A)	P-XI : Practical's based on P-VII & P-IX	04	10 practical	40	10	50	2
	CCPP III (Section B)	SEC II (1 Skill / optional)			-	15×3 = 45	-	(02)*
Total credits semester III and IV								12(04)*

ESE: End of Semester Marks C. A.: Continuous Assessment (Internal)

CLASS: B. Sc. THIRD YEAR

Semester V&VI

Semester	Course No.	Name of the Course	Instruction Hrs/ week	Total period	ESE	C. A.	Total Marks	Credits
V	DECP I (Section A)	Quantum Mechanics (P-XII)	03	45	40	10	50	2
	DECPI I [(Section B) Elective]	Solid State Physics Or Solar Energy Or Astrophysics Or Nuclear and Radiations Physics (P-XIII)	03	45	40	10	50	2
	DECPP I (Annual Patten Section A)	P-XVI :Practical's based on P- XII & P-XIII	04	10 Practical	40	10	50	2
	DECPP I (Section B)]	SEC III (1 Skill/ optional)			-	15×3 = 45	-	(02)*
VI	DECP II (Section A)	Atomic and Molecular physics (P-XIV)	03	45	40	10	50	2
	DECP II [(Section B) Elective]	Digital and Communication Electronics Or Linear and Digital Integrated Circuits Or Fibre optic communication Or Bio Physics (P-XV)	03	45	40	10	50	2
	DECPP II (Annual Pattern Section A)	P-XVII: Practical's based on P- XIII & P-XIV	04	10 Practical	40	10	50	2
	DECPP II (Section B)	SEC IV (Project))	03		5O	-	50	(2)*
Total credits semester V and VI								12(04)*

ESE: End of Semester Marks C. A.: Continuous Assessment (Internal)

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure (New scheme)

B. Sc. First year (Semester- I)

Semester Pattern effective from June -2016

Physics

CCP I (Section A)

***Mechanics and Properties of Matter* (P-I)**

Credits: 02 (Marks: 50) **Periods: 45**

Unit I: Mechanics (15 Periods)

Frames of reference, Laws of Mechanics (Newton's Laws of motion), inertial frame of reference, Centre of Mass. Conservation of momentum. Work, energy work energy Theorem, Conservation of energy, Angular velocity and angular momentum, Angular Momentum and Torque, Conservation of angular momentum,

Newton's law of Gravitation, Keplar's laws of Planetary Motion , Keplar's deduction from Newton's laws, Gravitational Field, Gravitational Intensity, Gravitational Potential, Gravitational Potential energy ,Potential and field Intensity due to uniform Solid Sphere at a point (Point inside and outside).

Unit–II: Surface Tension (08 Periods)

Definition of Surface Tension, Curvature pressure and Surface Tension, Difference of pressure on two sides of liquid surface, Expression for Excess Pressure inside a Spherical Drop and spherical Soap Bubble, Surface Tension by Jaeger's Method, Surface Tension by Ferguson Method.

Unit- III: Viscosity (10Periods)

Introduction, Coefficient of Viscosity, Streamline flow, critical velocity, Bernoulli's theorem, (Kinetic energy, Potential energy, Pressure energy) Poiseuille's equation for the flow of liquid through a tube, Determination of coefficient viscosity by Poiseuille's Method.

Unit- IV: Elasticity (12 Periods)

Definition of three types of Elastic stress and Strains, Deformation of cube (Bulk Modulus),Modulus of Rigidity and Young's modulus, Relation connecting elastic constants, Twisting couple on a cylinder or a (wire), Tensional pendulum.

Bending of Beam, Bending Moment, Cantilever (Weight of the beam is ineffective, Weight of the beam is effective), Depression of a Beam supported at the ends and loaded at the centre, Determination of Y by bending of beam.

Books Recommended:

1. Elements of Properties of Matter –D.S.Mathur, Shamlal Charitable trust, New Delhi.

2. General Properties of Matter – J. C. Upadhyaya, Ram Prasad & Sons, Agra.

3. Mechanics- J. C. Upadhyaya, Ram Prasad & Sons, Agra.

CCP I (SectionB)

Mathematical Methods In Physics (P-II)

Credits: 02 (Marks: 50) **Periods: 45**

Unit–I: Vector Analysis (15 Periods)

Vector triple product, Scalar triple product, Vector identity, Scalar and vector field , Gradient of a scalar field , Divergence of a vector field and Curl of a vector field and their Physical interpretation , Laplacian Operator (∇^2), Line integral, Surface integral, Volume integral, Gauss's divergence theorem, Stoke's theorem, Green's theorem (Statements only).

Unit II: Complex variables (10 Periods)

Introduction, Definition, complex algebra (Addition, Subtraction, Multiplication, Division, conjugate complex number), Argand diagram, Graphical representation of Sum, Difference, product and Quotient of complex number, Extraction of Roots, Properties of moduli ,arguments and geometry of complex numbers, , Rectangular, polar and exponential form of complex numbers.

Unit –III: Partial Differentiation (10 Periods)

Definition of Partial Differentiation, total Differentiation, and Chain rule, Order of Differentiation, Change of variables from Cartesian to Polar Co-ordinates, Implicit, Condition for maxima and minimum (without proof), **Solutions Some Partial Differential Equations**: Solutions to partial differential equations, using separation of variables: Laplace's Equation in problems of spherical symmetry, rectangular symmetry.

Unit -IV: Fourier Series (Book 9, 10) (10 Periods)

Definition, Evaluation of the coefficients of Fourier series, Cosine series, Sine series, Dirichlet's Conditions, Graphical representations of even and odd functions, Physical applications of Fourier series analysis, Square wave, Half wave Rectifier,

Books Recommended:

1. Vector Analysis - Murray R. Spigel
2. Mathematical Physics - B.S. Rajput
3. Mathematical Physics- B.D. Gupta (Vikas publishing House)
4. Methods of Mathematical Physics by Laud Talbout and Gambhir
5. Mathematical methods in Physical Sciences- Masy and Bias.
6. Mathematics For Engineers and Physists - Pipe

Swami Ramanand Teerth Marathwada University Nanded
Choice Based Credit System (CBCS) Course Structure (New scheme)
B. Sc. First year (Semester – II)
Semester Pattern effective from June -2016
Physics
CCP II (Section A)
Heat *and Thermodynamics* (P-III)

Credits: 02 (Marks: 50) **Periods: 45**

Unit–I: **Kinetic Theory** (**9 Periods)**

Mean free path, Transport Phenomena, Viscosity of Gases, Thermal Conductivity of Gases, Diffusion, Inter relation between three transport coefficients.

Unit –II : Low Temperature Physics (12Periods)

Andrew's Experiment on CO_2, Amagat's Experiment, Behavior of Gases at high pressure, Porous Plug Experiment, Vander wall's Equation of State, Critical Constants, Corresponding states, Coefficients of Vander wall's Equation, Boyles temperature, Temperature of Inversion Relation between Boyles temperature and Temperature of Inversion, Reduced Equation of State, properties of matter near critical point.

Unit–III: Thermodynamics (12Periods)

First Law of Thermodynamics, Relation connecting P, V and T in an Adiabatic Process, Second Law of Thermodynamics (Kelvin and Clausius statements), Carnot's cycle, Carnot's heat Engine , Carnot's Theorem, Entropy , Entropy of Irreversible processes, entropy of reversible process Third Law of Thermodynamics.

Thermodynamic Relations : Maxwell's Thermodynamical Relations, T- ds equations, Clausius-Clapeyron latent heat equations, Internal energy, Helmholtz' function, Enthalpy, Gibb's function

Unit-IV: Theory of Radiation (12Periods)

Blackbody radiation, Spectral distribution, Concept of Energy Density, Derivation of Planck's law, Deduction of Wien's distribution law, Rayleigh- Jeans Law, Stefan Boltzmann Law and Wien's displacement law from Planck's law.

Books Recommended:

1. Heat and Thermodynamics – Brij Lal, N.Subrahmanyam, P. S.Hemne For B. Sc. Students as per UGC Model Syllabus, Sultan Chand & Company Ltd.
2. Heat and Thermodynamics – D.S.Mathur, Sultan Chand & Sons, New Delhi
3. Thermodynamics and Statistical Physics – S.L.Kakani
4. Thermodynamics, Kinetic Theory, and Statistical Thermodynamics – Sears and Salinger, Narosa Publishing House, New Delhi.

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure (New scheme)

B. Sc. First year (Semester – II)

Semester Pattern effective from June -2016

Physics

CCPII(Section B)

Electricity and Magnetism (P-IV)

Credits: 02 (Marks: 50) **Periods: 45**

Unit–I :Basic Electricity Principles And AC Currents (15 Periods)

Voltage, Current, Resistance, and Power. Ohm's law.Series, parallel, and series-parallel combinations. AC Electricity and DC Electricity. Familiarization with multimeter, voltmeter and ammeter.

AC through LCR circuit, (series resonance and Parallel Resonance circuits) Complex numbers and Their Applications in solving AC Circuit Problems, Complex Impedance and Resistance, Power in AC circuit Power Factor, Choke, Transformer Principle, with current and voltage ratios; Efficiency of transformer Types of Transformers: step down and Step up, Power loss In Transformer, AC bridge, Owns Bridge.

Unit- II: Electromagnetic Induction (10 Periods)

Definition, Faradays Law of Electromagnetic Induction, Self induction, self induction of a Solenoid, Mutual induction, Mutual Induction of a pair of coil, Work done in Establishing Current in an Inductance, Mutual inductance of a Co axial Solenoids, Problems.

Unit- III: Magnetization (10 Periods)

Introduction, Magnetic Induction, Intensity of magnetization, Permeability, Susceptibility, Relation between Permeability and Susceptibility, Hysteresis curve, I-H curve By magnetometer Method, Moving coil type Ballistic Galvanometer, logarithmic decrement, damping correction,

Unit- IV: Magnetostatics : (10Periods)

Definition of Magnetic Field, Lorentz Force, Force on a Current Carrying Conductor, Magnetic Dipole Moment, Biot And Savert Law, and Its Applications to straight conductor, Circular coil, Amperes Circuital Law and its Curl.

Books **Recommended:**

1. Foundations of Electromagnetic theory- Reitz,Milford,Christey
2. Electricity and Electronics – D.C.Tayal (Himalaya Publishing House, Mumbai)
3. Introduction to Electrodynamics – D.G. Griffith
4. Electricity and Magnetism - Brij Lal, Subramanyan (Ratan Prakashan Mandir,Twentieath revised and enlarged edition 1997)
5. Electricity and Magnetism – Khare, Shrivastav (Twentieath revised 1997)

Practical Paper: CCPP-I (P-V)
(Annual practical Based on [CCPI & II (Section A & B))

Credits: 04 (Marks: 100)

1. Y- by Spiral spring.

2. **η** - by Spiral spring.

3. **η** - by Static torsion.

4. **η** - by Maxwell's needle.

5. Y- by bending loaded at the middle.

6. Viscosity of given liquid by Poiseuille's method.

7. Surface Tension of liquid by Jaeger's method.

8. Determination of Viscosity of given liquid by Searle's Viscometer.

10. Thermal conductivity by Searle's method

11. Thermal conductivity by Forbe's Method.

12. Study of Emf developed across the thermocouple junction

13. Small resistance by Carry Fosters Bridge.

14. Field along the axis of Circular coil (Determination of radius of the coil)

15. Ballistic galvanometer (Figure of merit)

16. Comparison of capacity by Desouty Method

17. Earth Inductor Determination of horizontal component of Magnetic field.

18 Introduction to Scilab, Advantages and disadvantages, Scilab environment, Command window, Figure window, Edit window, Variables and arrays, Initialising variables in Scilab,

19 Solving Simple Operations: Addition Subtraction, Multiplication and division

20 Addition and subtractions of simple complex numbers using Sci lab software

21. Solving solution to first order differential partial differential equation using computer software (Sci Lab)

The aim of this Lab is to use the computational methods to solve physical problems. The course will consist of lectures (both theory and practical) in the Computer Lab. Evaluation done not on the basis of programming but on the basis of formulating the problem. Each student appearing for examination must produce a journal showing that he has completed not less than **12** experiments during the year out of them tow may be of computer lab.

Swami Ramanand Teerth Marathwada University, Nanded

SEMESTER PATTERN CURRICULUM UNDER
CHOISE BASED CREDIT SYSTEM (CBCS)
FACULTY OF SCIENCE
UNDER GRADUATE (UG) PROGRAMMES
B. Sc. FIRST YEAR

SUBJECT:ZOOLOGY

w.e.f. June 2016

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED VISHNUPURI, NANDED (M.S.)

Board of Studies in Zoology

Sr. No.	Name	Designation and Address
1.	**Dr. Mali Rajendra Prabhakar**	**Chairman-BOS** Head & Associate Professor, Department of Zoology, Yeshwant Mahavidyalaya, Nanded Ph. No.: 09823546255 E-mail Id: rpmali62@gmail.com
2.	**Dr. Barde Ravi Dhondiraj**	**Member,** Head & Associate Professor, Department of Zoology, Shri Guru Buddhi Swami Mahavidyalaya, Purna, Dist. Parbhani Ph. No.: 09923830592 E-mail Id: ravibarde4u@rediffmail.com
3.	**Dr. Shaikh Isakh Maheboob**	**Member,** Head & Associate Professor, Department of Zoology, D. S. M. Mahavidyalaya, Jintur Dist. Parbhani Ph. No.: 09421353657
4.	**Dr. Kolpuke Madhav Nivarti**	**Member,** Head &Associate Professor, Department of Zoology, Maharashtra Mahavidyalaya, Nilanga Dist. Latur Ph. No.: 09423349792 E-mail Id: mnkolpuke@gmail.com
5.	**Dr. Gore Ghansham Dharbaji**	**Member,** Head &Associate Professor, Department of Zoology, Shri Sant Gadge Maharaj Mahavidyalaya, Loha Dist. Nanded Ph. No.: 09960707490
6.	**Dr. Bhalerao Sudam Sakharam**	**Member,** Head &Associate Professor, Department of Zoology, Bahirji Smarak Mahavidyalaya,

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7.	**Dr. G. Gyananath**	**Member,** Professor, Department of Zoology, School of Life Science, S. R. T. M. University, Nanded Ph. No.: 09850486910
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Chairman, BOS in Zoology, SRTMU Nanded
(Dr. R.P. Mali)
Professor and Head,
PG & Research Department of Zoology
Yeshwant Mahavidyalaya, Nanded

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED
SEMESTER PATTERN CURRICULUM UNDER
CHOICE BASED CREDIT SYSTEM (CBCS)
Faculty of Science
Under Graduate (UG) Programmes
SUBJECT: ZOOLOGY
(w. e. f. June -2016)

INTRODUCTION:

The SRTMUN is gearing up for several initiatives towards academic excellence, quality improvement and administrative reforms. In view of this priority and in-keeping with Vision and Mission; process was already initiated towards introduction of semester system, grading system and credit system. In the recent past, University had already implemented Credit based grading system to campus schools and Choice Based Credit System (**CBCS**) for PG in all the affiliated colleges from the academic year **2014-2015**. These regulations shall be called as Choice Based Course Credit System & Grading, 2014. In short it will be referred as **SRTMUN CBCS REGULATION**.

Now University is going one step ahead to implement Choice Based Credit System (**CBCS**) for UG in all the affiliated colleges from the academic year **2016-2017** progressively for UG Zoology. Revision and updating of the curriculum is the continuous process to provide an updated education to the students at large. Presently there is wide diversity in the curriculum of different Indian Universities which inhibited mobility of students in other universities or states.

To ensure and have uniform curriculum at UG and PG levels as per the **SRTMUN CBCS REGULATION**, curriculum of different Indian Universities, syllabus of NET, SET, MPSC, UPSC, Forest Services and the UGC model curriculum are referred to serve as a base in updating the same.

The B.Sc. Zoology (General) semester pattern course is running in different affiliated colleges of the SRTMUN. The course content has been designed under CBCS pattern. The course content of each theory paper is divided into units by giving appropriate titles and subtitles. For each unit, total number of periods required, weight age of maximum marks and credits are mentioned. A list of practical exercises and skills for laboratory work to be completed in the academic year is also given.

A list of selected reading material and a common skeleton question paper for all papers of semester-I,II, III, IV, V&VI are also provided at the end of the syllabus.

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SUBJECT: ZOOLOGY
(w. e. f. June -2016)

OBJECTIVES:

1. To provide an updated education to the students at large in order to know the importance and scope of the discipline and to provide mobility to students from one university or state to other.

2. To update curriculum by introducing recent advances in the subject and enable the students to face NET, SET, UPSC and other competitive examinations successfully.

3. To impart knowledge of zoology (animal science) as the basic objective of Education

4. To develop a scientific attitude to make students open minded, critical and curious

5. To develop an ability to work on their own and to make them fit for the society

6. To expose themselves to the animal diversity amongst life forms

7. To develop skill in practical work, experiments, equipments and laboratory use along with collection and interpretation of animal materials and data.

8. To make aware of natural resources and environment and the importance of conserving the same

9. To develop ability for the application of the acquired knowledge in the fields of life so as to make our country self reliant and self sufficient

10. To appreciate and apply ethical principles to animal sciences research and studies.

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Under Graduate (UG) Programmes
SUBJECT: ZOOLOGY
(w. e. f. June -2016)

An Outline:

CLASS: B. Sc. FIRST YEAR

Semester/ Annual	Course Name		Paper No. & Title	Total periods Periods/ Week	Marks for		Credits (Marks)
					External (ESE)	Internal (CA)	
Semester-I	**CCZ-I**	**Section-A**	**Theory Paper-I:** Life & Diversity of Animals – I (Non-Chordata)	45 (03/week)	40	10	Credits: 02 (Marks:50)
		Section-B	**Theory Paper-II:** Cell Biology	45 (03/week)	40	10	Credits: 02 (Marks:50)
Semester-II	**CCZ-II**	**Section-A**	**Theory Paper-III:** Life & Diversity of Animals – II (Chordata)	45 (03/week)	40	10	Credits: 02 (Marks:50)
		Section-B	**Theory Paper-IV:** Developmental Biology	45 (03/week)	40	10	Credits: 02 (Marks:50)
Annual pattern	**CCZP-I Section A + Section B**		**Practical Paper-V:** Practical's based on theory papers of CCZ-I & II	22 Prac. (03/week/ batch)	80	20	Credits: 04 (Marks:100)
Total Credits of Semester-I and II					240	60	Credits: 12 (Marks:300)

CCZ: Core Course Zoology, **CCZP:** Core Course Zoology Practical, **ESE:** End of Semester Examination, **CA:** Continuous Assessment

Distribution of marks: 80% of the total marks for ESE and 20% for CA

CA of Marks-10: 05 marks for Test/ Assignments & 05 marks for attendance

CA of Marks-20: 10 marks for Test & 10 marks for attendance

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

SEMESTER PATTERN CURRICULUM UNDER

CHOICE BASED CREDIT SYSTEM (CBCS)

Faculty of Science

Under Graduate (UG) Programmes

SUBJECT: ZOOLOGY

(w. e. f. June -2016)

CLASS: B. Sc. SECOND YEAR

An Outline:

Semester/ Annual	Course Name		Paper No. & Title	Total Periods	Marks for		Credits (Marks)
					External (ESE)	Internal (CA)	
Semester-III	CCZ-III	Section-A	Theory Paper-VI: Genetics	45 (03/week)	40	10	Credits: 02 (Marks:50)
		Section-B	Theory Paper-VII: Comparative Anatomy & Physiology	45 (03/week)	40	10	Credits: 02 (Marks:50)
Semester-IV	CCZ-IV	Section-A	Theory Paper-VIII: Genetic Engineering & Evolution	45 (03/week)	40	10	Credits: 02 (Marks:50)
		Section-B	Theory Paper-IX: Endocrinology, Histology & Biochemistry	45 (03/week)	40	10	Credits: 02 (Marks:50)
Annual pattern	CCZP-II	Section-A	Practical Paper-X: Practicals based on theory papers-VI & VIII	10 Prac. (03/week/ batch)	40	10	Credits: 02 (Marks:50)
		Section-B	SEC- I: (1 Skill/Optional)	10 Prac. (03/week/ batch)	--	15x3=45* (50*)	Credits: 02* (Marks:50)
Annual pattern	CCZP-III	Section-A	Practical Paper-XI: Practicals based on theory papers-VII& IX	10 Prac. (03/week/ batch)	40	10	Credits: 02 (Marks:50)
		Section-B	SEC-II: (1 Skill/Optional)	10 Prac. (03/week/ batch)	--	15x3=45* (50*)	Credits: 02* (Marks:50)
Total Credits of Semester-III and IV					240	60 (100*)	Credits: 12 (04*) (Marks:300)

CCZ: Core Course Zoology, CCZP: Core Course Zoology Practical, ESE: End of semester examination, CA: Continuous Assessment, SEC: Skill Enhancement Course

Distribution of marks: 80% of the total marks for ESE and 20% for CA

CA of Marks-10: 05 marks for Test/ Assignments & 05 marks for attendance

SEC-I: 15marks/Skill/Optional (15x3 =45); Attendance-05 marks

SEC-II: 15marks/Skill/Optional (15x3 =45); Attendance-05 marks

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

SEMESTER PATTERN CURRICULUM UNDER

CHOICE BASED CREDIT SYSTEM (CBCS)

Faculty of Science

Under Graduate (UG) Programmes

SUBJECT: ZOOLOGY

(w. e. f. June -2016)

CLASS: B. Sc. THIRD YEAR

An Outline:

Semester / Annual	Course Name		Paper No. & Title	Total Periods	Marks for		Credits (Marks)
					External (ESE)	Internal (CA)	
Semester-V	DSEZ-V	Section-A	Theory Paper-XII: Ecology & Zoogeography	45 (03/week)	40	10	Credits: 02 (Marks: 50)
		Section-B	Theory Paper-XIII: Aquaculture Or Theory Paper-XIII: Applied Parasitology Or Theory Paper-XIII: Entomology Or Theory Paper-XIII: Environmental Science	45 (03/week)	40	10	Credits: 02 (Marks: 50)
Semester-VI	DSEZ-VI	Section-A	Theory Paper-XIV: Ethology, Biometry & Bioinformatics	45 (03/week)	40	10	Credits: 02 (Marks: 50)
		Section-B	Theory Paper-XV: Pisciculture Or Theory Paper-XV: Applied Parasitology Or Theory Paper-XV: Entomology Or Theory Paper-XV: Environmental Science	45 (03/week)	40	10	Credits: 02 (Marks: 50)
Annual pattern	DSEZP-I	Section-A	Practical Paper-XVI: Practicals based on theory papers-XII&XIV	10 Prac. (03/week/ batch)	40	10	Credits: 02 (Marks: 50)
		Section-B	SEC-III: (1 Skill/Optional)	(03/week/ batch)	--	15x3=45* (50*)	Credits: 02 (Marks: 50)

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

SEMESTER PATTERN CURRICULUM UNDER

CHOICE BASED CREDIT SYSTEM (CBCS)

Faculty of Science

Under Graduate (UG) Programmes

SUBJECT: ZOOLOGY

(w. e. f. June -2016)

Semester/ Annual	Course Name		Paper No. & Title	Total Periods	Marks for		Credits (Marks)
					External (ESE)	Internal(CA)	
Annual pattern	DSEZP-II	Section-A	Practical Paper-XVII: Practicals based on theory papers-XIII&XV	10 Prac. (03/week/ batch)	40	10	Credits: 02 (Marks: 50)
		Section-B	SEC-IV: (Skill based Project)	(03/week/ batch)	--	50*	Credits: :02* (Marks: 50)
Total Credits Semester-V and VI					240	60 (100*)	Credits: 12 (Marks:300) Credits:(04*) Marks:(100*)

CCZ: Core Course Zoology, CCZP: Core Course Zoology Practical, ESE: End of semester examination, CA: Continuous Assessment, SEC: Skill Enhancement Course, DSEZ: Discipline Specific Elective Zoology

Distribution of marks:

80% of the total marks for ESE and 20% for CA

CA of Marks-10: 05 marks for Test/ Assignments & 05 marks for attendance

SEC-III: 15marks/Skill/Optional (15x3 =45); Attendance-05 marks -Marks 50*

SEC-IV: PROJECT of marks 50*: 50 Marks/Project/Any one optional

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY,
NANDED VISHNUPURI, NANDED (M.S.)

CBCS PATTERN
B.Sc. FIRST YEAR (SEMESTER I)
w.e.f. June 2016
ZOOLOGY
CCZ-I (SECTION A)

LIFE AND DIVERSITY OF ANIMALS – I (Non-Chordata)
(Theory Paper-I)

Credits: 02 Marks: 50 **Periods: 45**

UNIT I **11**

1. **Introduction of Non-chordates**
2. **Protozoa:**
   General Characters and classification up to class level.
   Plasmodium vivax-
   Structure, Life Cycle, Pathogenicity and Control Measures.
3. **Porifera**:

   General Characters and classification up to class level.

   Sycon:

   General Morphology, different types of cells.

   Economic Importance of Porifera

UNIT II **11**

1. Coelenterata:

General Characters and classification up to class level.

Polymorphism in Coelenterata.

Coral, and Coral reefs, its Economic Importance.

2. Platyhelminthes:
General Characters and classification up to class level.

Taenia solium: Structure and life cycle

3. **Nematohelminthes**.
Ascaris: Structure and life cycle.

UNIT – III **12**

1. Annelida:

General Characters and classification up to class level.

Role of Earthworm in Agriculture.

2. Arthropoda:

General Characters and classification up to class level.

Cockroach :

External Morphology, Digestive system, Respiratory system, Nervous system.

Economic Importance of Insects

UNIT IV **11**

1. Mollusca:

General Characters and classification up to class level.

Economic Importance of Mollusca**.**

2. **Echinodermata:**

General Characters and Classification up to class level.

Star Fish

External Morphology and Water vascular system.

3. **Hemichordata**:

General Characters and Affinities.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY,
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CBCS PATTERN
B.Sc. FIRST YEAR (SEMESTER I)
w.e.f. June 2016
ZOOLOGY
CCZ-I (SECTION B)

CELL BIOLOGY
(Theory Paper-II)

Credits: 02 Marks: 50 **Periods: 45**

UNIT- I

1. **Introduction of Cell Biology** **12**
2. **Microscopy** (An elementary idea)
   a) Light microscopy
   b) Electron microscopy
3. **Types of cells**:
   a) Prokaryotic cell structure
   b) Eukaryotic cell structure
4. **Plasma membrane:**
   a) Structure
   i) Bimolecular model,
   ii) Trilaminar model,
   iii) Lattice model,
   iv) Fluid mosaic model,
   v) Micellar model,
   b) Composition
   c) Functions.

UNIT- II 11

1. **Endoplasmic reticulum**:
   a) Structure
   b) Functions
2. **Golgi complex:**
   a) Structure
   b) Functions
3. **Mitochondria:**
   a) Structure
   b) Functions

4. **Ribosomes:**
   a) Structure
   b) Functions

UNIT – III **11**

1. **Lysosomes:**
   a) Structure
   b) Functions

2. **Nucleus:**
   a) Structure
   b) Functions
3. **Nucleolus:**
   a) Structure
   b) Functions
4. **Chromosome:**
   a) Shape – (metacentric, submetsacentric ,Acrocentric and Telocentric,)
   b) Structure
   c) Functions
   d) Polytene and Lampbrush chromosomes

UNIT – IV **11**

1. **Cell cycle:**
   a) Phases
   b) Mitosis and its significance
   c) Meiosis and its significance

2. **Cytology of cancer:**
   Malignant and Non-malignant

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY,
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CBCS PATTERN
B.Sc. FIRST YEAR (SEMESTER II)
w.e.f. June 2016
ZOOLOGY
CCZ-II (SECTION A)

LIFE AND DIVERSITY OF ANIMALS -II (CHORDATA)

(Theory Paper- III)

Credits: 02 Marks: 50 **Periods: 45**

UNIT I **10**

1. Introduction of Chordates.

2. Protochordata:

Urochordata:- General characters, concept of retrogressive metamorphosis.

Cephalochordata: General Characters.

3. Agnatha:

Cyclostomata : General characters of cyclostomes.

UNIT II **12**

1. Pisces:

General characters and classification of Pisces up to class level.

Scoliodon (Dogfish):

External characters, Digestive system,
Respiratory system, Circulatory System, Nervous system.
Economic Importance of Fishes.

UNIT III **11**

1. Amphibia:-

General characters and classification up to order level.
Parental care in amphibians.
Summer and Winter sleep in Frog.

2. Reptilia:

General characters.
Poisonous and Non-poisonous snakes.
Importance of snake Venom.

3. Aves:

General characters.

Flight Adaptations in birds.

Migration of birds.

UNITS IV **12**

1. Mammals:

General characters and classification up to order level.

2. Rat-

External characters,
Digestive system (Anatomy),
Respiratory system,
Circulatory system.
Nervous system - Brain and spinal cord
Eye and Ear.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY,
NANDED VISHNUPURI, NANDED (M.S.)

CBCS PATTERN
B.Sc. FIRST YEAR (SEMESTER II)
w.e.f. June 2016
ZOOLOGY
CCZ-II (SECTION B)

DEVELOPMENTAL BIOLOGY
(Theory Paper-IV)

Credits: 02 Marks:-50 **Periods: 45**

UNIT- I **11**

1. Introduction of Developmental Biology
2. **Gametogenesis:**
   a) Spermatogenesis
   b) Oogenesis
3. **Types of eggs**
   a) On the basis of amount of yolk
   b) On the basis of distribution of yolk

UNIT- II **11**

1. **Gametes of frog:**
   a) Structure of sperm
   b) Structure of ovum
2. **Frog Embryology:**
   a) Fertilization
   b) Cleavage
   c) Blastulation
   d) Gastrulation
   e) Formation of three germinal layers
3. **Regeneration in Non- chordates and chordates**

UNIT – III **11**

1. **ChickEmbryology:**
   (Extra-embryonic membranes)-
   a) Yolk sac, structure and its functions
   b) Amnion, structure and its functions
   c) Chorion, structure and its functions
   d) Allantois ,structure and its functions
2. **Plancentation in mammals**:
   Classification on the basis of
   a) Mode of origin
   b) Mode of distribution of villi
   c) Functions of Placenta

UNIT- IV **12**

1. **Stem Cell:**
   a) Sources
   b) Types – Embryonic, Haemopoitic, Adult, Nervous
   c) Role of stem cells in human welfare
2. **Embryo Transfer Techniques:**
   a) Gamete Intra-Fallopian Transfer (GIFT)
   b) Test tube baby
   c) Infertility in male
   d) Infertility in female
3. **Parthenogenesis:**
   a) Natural
   b) Artificial

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY,
NANDED VISHNUPURI, NANDED (M.S.)

CBCS PATTERN
w.e.f. June 2016
B.Sc. FIRST YEAR
ZOOLOGY
CCZP-I (Section A + Section B)

(PRACTICAL'S BASED ON THEORY PAPERS OF CCZ-I & II)
(PRACTICAL PAPER- V)

Credits: 04 Marks: 100 **Practicals: 22 (03/Week/Batch)**

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1) Study of at least two museum specimens from Invertebrate Phyla. (Protozoa to Echinodermata and Hemichordate) **(3 Practicals)**

2) Study of at least two museum specimens from Protochordata to Mammalia. **(3 Practicals)**

3) Demonstration based on Models, Charts and Computer Aided Techniques: (3 Practicals)

i) Cockroach: Digestive system, Nervous system.

ii) Scoliodon: Digestive system, Heart and ventral Aorta, Afferent arteries, Brain

4) Mountings - (3 Practicals)

i) Mouth parts of Cockroach

ii) Trachea of Cockroach

iii) Salivary glands of Cockroach

iv) Nereis Parapodia

v) Mountings of Scales (by Local Available Fishes): Ctenoid and Cycloid.

5) Skeleton of Rat/Rabbit: Atlas Vertebra, Thoracic Vertebra, Pectoral Girdle, Pelvic Girdle, Humerus, Femur, Tibia-Fibula, Radius-ulna (Models / Charts). **(3 Practicals)**

6) Study of permanent slides of mitosis.

7) Squash preparation of Onion root tips.

8) Study of permanent slides of meiosis.

9) Squash preparation of Onion buds.

10) Study of permanent slides of Frog Embryology (Any Five).

11) Study of permanent slides of Chick Embryo: 18 hrs. 24 hrs. 36 hrs. 48 hrs. 72 hrs. Stages.

12) Short excursion/ study Tour is compulsory.

Note: Submission:
i) Practical record book duly signed by the teacher in charge/Head of the Department.
ii) Five permanent stained micro preparations.
iii) Excursion report.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

FACULTY OF SCIENCE

CBCS PATTERN

B.SC. FIRST YEAR

w.e.f. June 2016

SUB: - ZOOLOGY

(NON CHORDATES, CELL BIOLOGY, CHORDATES AND DEVELOPMENTAL BIOLOGY)

PRACTICAL EXAMINATION

QUESTION PAPER PATTERN

(Practical Paper-V)

Time : 4 Hours **Credits: 04 Marks : 80**

Center No. :

Batch No. :

Date :

Q.1	Demonstrate ------- so as to explain its ---------System and leave a labelled diagram (Scoliodon- Digestive System, Heart, Ventral aorta and brain.)	10
Q.2	Demonstrate ------- so as to explain its --------System and leave a labelled Diagram. (Cockroach- Digestive System and Nervous System)	10
Q.3	Spotting : Identify and Describe as per instructions (1 - 10 Spots) (4- invertebrate, 3- vertebrate, 1- Bone,1- Frog Embryo slide ,1- Chick Embryo slide)	20
Q.4	Prepare a permanent stained micro preparation of material provided. (Mounting of Scales of local available fishes/ Mouth parts/ Trachea/ Salivary glands of cockroach/ Nereis Parapodia)	10
Q.5	Prepare a temporary Squash preparation of Onion Root tips for Mitosis. (Identify, sketch and describe any one stage)	10
Q.6	Record Book.	10
Q.7	Excursion report and submission of slides	10

Note: Demonstration of animals through Models, Charts and Computer Aided Techniques