SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED
SEMESTER PATTERN CURRICULUM UNDER
CHOICE BASED CREDIT SYSTEM (CBCS) FOR
Faculty of Science
Under Graduate (UG) Programmes
SUBJECT: BOTANY
CLASS: B.Sc. SECOND YEAR

CURRICULUM DESIGNING COMMITTEE

1. **Dr.Bodke S.S.**   Chairman
   Yeshwant Mahavidyalaya, Nanded

2. **Dr. (Mrs.) S.G. Pillai**   Member
   Shivaji Mahavidyalaya, Parbhani

3. **Dr. Mandge S.V**.   Member
   Shri. SGM College, Loha

(With effect from Academic Year 2017-2018)

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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 courses are also provided at the end of the syllabus.

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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

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CLASS: B.Sc. SECOND YEAR

An Outline:

Semester/ Annual	Course No.	Course Name	Instruction Hrs/week	Total Periods	Marks for		Credits (Marks)
					Internal (CA)	External (ESE)	
Semester-III	CCB-III (Section-A)	Morphology and Taxonomy of Angiosperms (P-VI)	03	45	10	40	Credits: 02 (Marks:50)
	CCB-III (Section-B)	Histology, Anatomy and Embryology of Angiosperms (P-VII)	03	45	10	40	Credits: 02 (Marks:50)
Semester-IV	CCB-IV(Section-A)	Gymnosperms and Palaeobotany (P-VIII)	03	45	10	40	Credits: 02 (Marks:50)
	CCB-IV(Section-B)	Ecology and Environmental Biology (P-IX)	03	45	10	40	Credits: 02 (Marks:50)
Annual Pattern	CCBP-II	Practicals based on CCB-III (Section-A) (P-X)	03	08 Practicals	05	20	Credits: 02 (Marks:50)
		Practicals based on CCB-IV (Section-A) (P-X)	03	08 Practicals	05	20	
	SECB-I	Any one skill from optional (SECB-I)	03	45	25	25	Credits: 02 (Marks:50)
Annual Pattern	CCBP-III	Practicals based on CCB-III (Section-B) (P-XI)	03	08 Practicals	05	20	Credits: 02 (Marks:50)
		Practicals based on CCB-IV (Section-B) (P-XI)	03	08 Practicals	05	20	
	SECB-II	Any one skill from optional (SECB-II)	03	45	25	25	Credits: 02 (Marks:50)
Total Credits Semester-III and IV					Marks: 60+50= 110	Marks: 240+50= 290	Credits: 12+04=16 (Marks: 300+100 =400)

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

CA: Continuous Assessment, **SECB:** Skill Enhancement Course Botany

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

- **CA of Marks-10:** 10 marks for Test / Record Book & Viva voce
- **CA of Marks 25:** 15 for marks Seminar & 10 marks for Test

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SUBJECT: BOTANY
CLASS: B.Sc. SECOND YEAR
SEMESTER–III
CCB-III (SECTION-A): **MORPHOLOGY AND TAXONOMY OF ANGIOSPERMS (P-VI)**

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

UNIT-I: MORPHOLOGY OF ANGIOSPERMS *(10 periods)*

Root: Definition, characters, types (tap root and adventitious) and functions. **Stem:** Definition, characters, modifications (stem tendril, phylloclade, tuber, rhizome, corm and runner) and functions. **Leaf:** Definition, structure of typical leaf (Hibiscus), functions, types- Simple (Hibiscus), Compound (unipinnate, bipinnate, tripinnate, unifoliate, bifoliate, trifoliate, multifoliate), venation- definition, types (reticulate, parallel), Phyllotaxy, **Inflorescence:** Definition, types- Racemose (characters), Cymose (characters), **Flower:** Definition, symmetry, actinomorphic, zygomorphic, types (hypogynous, epigynous, perigynous), structure of typical flower (Hibiscus), calyx (polysepalous, gamosepalous), corolla (polypetalous, gamopetalous), androecium (parts of a stamen), gynoecium –structure of carpel, apocarpous, syncarpous, placentation (axile, parietal, free central, marginal, basal) **Fruit:** Definition, types (true, false), forms- simple (dry, legume, fleshy, berry), aggregate (etaerio of berries), composite (sorosis)

UNIT-II: TAXONOMY OF ANGIOSPERMS *(10 periods)*

Introduction, scope and objectives of angiosperm taxonomy, binomial nomenclature, taxonomic ranks, types of classification (artificial, natural and phylogenetic), salient features of Bentham & Hooker and Engler & Prantl's system of classification with merits and demerits

UNIT-III: STUDY OF FAMILIES-I (*13 periods*)

Distribution, vegetative morphology (habitat, habit, root, stem, leaf), Reproductive morphology (inflorescence, general description of flower, calyx, corolla, androecium, gynoecium, pollination, fruit) floral formula, floral diagram, systematic position (as per Bentham & Hooker's system), distinguishing characters and economic importance of plants (at least two) of the Families-**Annonaceae, Brassicaceae, Malvaceae, Meliaceae, Caesalpinaceae, Fabaceae, Apiaceae.**

UNIT-IV: STUDY OF FAMILIES-II *(12 periods)*

Distribution, vegetative morphology (habitat, habit, root, stem, leaf), Reproductive morphology (inflorescence, general description of flower, calyx, corolla, androecium, gynoecium, pollination, fruit), floral formula, floral diagram, systematic position (as per Bentham & Hooker's system), distinguishing characters and economic importance of plants (at least two) of the Families-**Asteraceae, Solanaceae, Euphorbiaceae, Lamiaceae, Liliaceae and Poaceae**

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CLASS: B.Sc. SECOND YEAR
SEMESTER–III
CCB-III (SECTION-B): HISTOLOGY, ANATOMY AND EMBRYOLOGY OF ANGIOSPERMS **(P-VII)**

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

UNIT –I: HISTOLOGY (*10 Period)*
Meristematic Tissue: Definition, classification based on position and origin,
Histological organization of root and shoot apices, Apical cell theory, Histogen theory and Tunica corpus theory.
Simple Tissues: Parenchyma, Collenchyma, Sclerenchyma.
Complex tissues: Xylem and Phloem.
Secretary tissues: Laticiferous tissues (Latex cells and vessels), Glandular tissues (External glands-digestive glands, nectary glands and internal glands-Oil glands, hydathodes)

UNIT II: ANATOMY *(12 Period)*
Vascular Bundles: Definition and types.
Primary structures:
Root anatomy of Monocotyledons (Maize) and Dicotyledons (Sunflower),
Stem anatomy of Monocotyledons (Maize) and Dicotyledons (Sunflower),
Leaf anatomy of Monocotyledons (Maize) and Dicotyledons (Sunflower),
Secondary Growth- Normal Secondary growth in root and stem of Dicotyledons (Sunflower), **Anomalous Secondary growth** in Achyranthes stem and Dracaena stem.

UNIT III: EMBRYOLOGY –I (*13 Periods)*
Introduction- Definition and Scope, **Microsporangium-** Structure (T.S. of typical anther), Microsporogenesis, Structure of Pollen grain, Pollination (self and cross pollination in brief), Development of male gametophyte, **Megasporangium-** Structure (L.S.of typical ovule), types of ovule

UNIT IV: EMBRYOLOGY –II *(10 Period)*
Megasporogenesis, Development of **Monosporic** (Polygonum type), **Bisporic** (Allium type) and **Tetrasporic** (Adoxa type) female gametophytes, **Fertilization-** Double fertilization and Significance, **Endosperm-** Definition and types (Nuclear, Cellular and Helobial endosperm) , **Embryo-** Definition, Development of Monocot and Dicot (Crucifer type) embryo, **Development of seed and Fruit** (Post fertilization changes)

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CLASS: B.Sc. SECOND YEAR
SEMESTER–IV
CCB-IV (SECTION-A): **GYMNOSPERMS AND PALAEOBOTANY (P-VIII)**

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

UNIT-I: GYMNOSPERMS (*10 periods***)**
Introduction, general characters and classification of Gymnosperms (as per D. D. Pant, 1957), Morphology of vegetative structures, anatomy of stem (primary and secondary growth) and anatomy of leaf, reproductive structures and life cycle (Developmental stages are not expected) and economic importance of *Cycas.*

UNIT-II: PINUS *(12 periods)*
Morphology of vegetative structures, anatomy of stem (primary and secondary growth) and anatomy of leaf, reproductive structures and life cycle (Developmental stages are not expected) and economic importance of *Pinus.*

UNIT-III: GNETUM *(13 periods)*
Morphology of vegetative structures, anatomy of stem (primary and secondary growth) and anatomy of leaf, reproductive structures and life cycle (Developmental stages are not expected), affinities and relationship with angiosperms and economic importance of *Gnetum.*

UNIT-IV: PALAEOBOTANY (*10 periods***)**
Introduction to palaeobotany, process of plant fossilization, types of fossils, geological time scale, Study of fossil Gymnosperms-*Lyginopteris oldhamia* (stem), *Bennettites* (flower) and General characters of *Ginkgo* (A living fossil).

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CLASS: B.Sc. SECOND YEAR
SEMESTER–IV
CCB-IV (SECTION-B): **ECOLOGY AND ENVIRONMENTAL BIOLOGY (P-IX)**

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

UNIT –I: ECOLOGICAL FACTORS *(10 Periods)*
Introduction-Definition of ecology and environment, divisions, fields and scope of ecology, Environmental or ecological factors- Climatic factors (Atmosphere, atmospheric humidity, light and temperature), Edaphic factor (Soil components, soil formation and soil profile)

UNIT-II: ECOLOGICAL ADAPTATIONS IN PLANTS *(10 periods)*
Morphological, anatomical and physiological responses of plants to water, Morphological and anatomical adaptation in Hydrophytes (Hydrilla stem and Nymphea petiole), Xerophytes (Casuarina stem and Nerium Leaf), Halophytes (General characters)

UNIT –III: COMMUNITY ECOLOGY   *(13 Periods)*
Community Ecology- Community characteristics, frequency, density, life forms and ecological succession (Hydrosere), analysis of plant community (quadrant method), Ecosystem- Introduction and structure (Abiotic and biotic components) of ecosystem, Pond and grassland ecosystems, Energy flow in an ecosystem, Food chain and food web, ecological pyramids.

UNIT –IV: ENVIROMENTIAL BIOLOGY   *(12 Periods)*
Biogeochemical cycles- Water and Nitrogen cycle, Pollution- Causes, effect and control measures of water, soil and air pollution, Soil erosion- Types, methods of soil conservation, Bio geographical regions of India, Aforestation, Deforestation and Chipko movement.

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SUBJECT: BOTANY
CLASS: B.Sc. SECOND YEAR
ANNUAL PATTERN
CCBP-II: PRACTICALS BASED ON SECTION-A OF CCB-III&IV (P-X)

Practical: 16   **Credits: 02 (Maximum Marks: 50)**

Practical Exercises:

1. Study of Morphology of angiosperms (Root, stem, leaf, inflorescence, flower and fruit as mentioned in syllabus of theory paper-VI) **(2 practical)**
2. Description, floral formula, floral diagram, identification and classification of at least one plant belonging to each family as mentioned in the syllabus of theory paper-VI **(8 practical)**
3. Morphological (vegetative and reproductive)study of **Cycas**: Male cone, Megasporophyll and ovule; **Pinus:** Male cone, Female cone and Ovule; **Gnetum:** Male cone, Female cone **(2 practical)**
4. Preparation of double stained permanent slides of Cycas pinna, Pinus needle and Gnetum stem for the study of anatomical structures **(3 practical)**
5. Palaeobotanical study of stem of *Lyginopteris oldhamia* and flower of *Bennettites*
    (1 practical)
6. *One short and one long Botanical excursion are compulsory (Students should submit excursion report in detail in the practical examination for evaluation. The report shall carry marks)*

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<ins>**SUBJECT: BOTANY**</ins>
CLASS: B.Sc. SECOND YEAR
ANNUAL PATTERN
CCBP-II: PRACTICALS BASED ON SECTION-A OF CCB-III&IV (P-X)

END OF SEMESTER EXAMINATION (ESE)
<ins>**Skeleton question paper**</ins>

Time: Four hours   **Maximum Marks: 40**

Note: *(i)*   *Attempt all questions*

        (ii)   *Show your preparation to the examiner*

        (iii)   *Draw neat and well labelled diagrams wherever necessary*

Q1.   Make a double stained permanent preparation, identify and describe the anatomical structures of the given specimen-A (Cycas pinna/ Pinus needle/ Gnetum stem for specimen-A may be given alternately to the students)   (**10 marks)**

Q2.   Describe, identify and classify the given Plant-B (Polypetalae) with floral formulae and floral diagrams (Flowering twig of the easily available plant for specimen-**B** may be given alternately to the students)
                (10 marks)

Q3.   Describe, identify and classify the given Plant-C (Gamopetalae) with floral formulae and floral diagrams (Flowering twig of the easily available plant for specimen-**C** may be given alternately to the students)
                (10 marks)

Q4.   Identify   and   describe   the   spots   (Morphology-2   spots,   Economic   Importance-2   spots, Gymnosperm/Palaeobotany-1 spot) giving reasons
                (10 marks)

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ANNUAL PATTERN
CCBP-III: PRACTICALS BASED ON SECTION-B OF CCB-III&IV (P-XI)

Practicals: 16   **Credits: 02 (Maximum Marks: 50)**

Practical Exercises:

1. Study of Meristematic tissues with the help of Slides/Models/Charts/ Photocopies **(2 practical)**
2. Study of Permanent and secretary tissues with the help of Slides/Models/Charts/ Photocopies **(1 practical)**
3. Preparation of a double stained permanent slide of stem of Maize, Sunflower, Dracaena and Achyranthus for the study of internal structures **(4 practical)**
4. Study of T.S. of anther and L.S. of anatropous ovule with the help of permanent slides and models **(1 practical)**
5. Determination of minimum number of quadrants required for estimation of biomass in grassland **(2 practical)**
6. Study of frequency of herbaceous species in grassland **(1 practical)**
7. Measurement of plant biomass above the ground in grassland **(1 practical)**
8. Measurement of bulk density and porosity of soil**(1 practical)**
9. Study of morphological and anatomical structures of ecological interest in the Hydrilla stem, Nymphea petiole, Casuarina stem and Nerium leaf **(3 practical)**
10. *One short and one long Botanical excursion are compulsory (Students should submit excursion report in detail in the practical examination for evaluation. The report shall carry marks)*

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ANNUAL PATTERN
CCBP-III: PRACTICALS BASED ON SECTION-B OF CCB-III&IV (P-XI)

END OF SEMESTER EXAMINATION (ESE)
Skeleton question paper

Time: Four hours   **Maximum Marks: 40**

Note: *(i)*   *Attempt all questions*
         (ii)   *Show your preparation to the examiner*
         (iii) *Draw neat and well labelled diagrams wherever necessary*

Q1. Make a double stained permanent preparation of the given specimen-**A**. Indentify and describe its internal structure. (The Maize stem / Sunflower stem / Dracaena stem / Achyranthus stem for specimen-A may be given alternately to the students)   **(12 marks)**

Q2. Make a temporary preparation of the given specimen-B. Indentify and describe its internal structures of ecological interest. (The Hydrilla stem/ Nymphea petiole/ Casuarina stem / Nerium leaf for specimen-B may be given alternately to the students)   **(10 marks)**

Q3. Determine minimum number of quadarnts required/ frequency/ plant biomass/bulk density and porosity of soil/ with the help of data given   **(10 marks)**

Q4. Identify and describe the given spots   (Histology- 2, Embryology -1, and Ecology-1) giving reasons   **(08 marks)**

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CLASS: B.Sc. SECOND YEAR
ANNUAL PATTERN
SKILL ENHANCEMENT COURSE BOTANY
SECB-I

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

SECB-IA: MEDICINAL PLANT PRODUCT PREPARATION SKILL

UNIT-I: MEDICINAL PLANTS (6 periods)
Introduction, Definitions, Scope and Importance, Concept of active principles
UNIT-II: STUDY OF MEDICINAL PLANTS (15 periods)
Description, Identification and Classification, medicinal uses of locally available medicinal plants (Awla, Adulsa, Ginger)
UNIT-III: PRACTICALS ON MEDICINAL PLANT PRODUCT PREPARATION (8 practicals)
Preparation of Awla candy, Awla masticator (Awla supari), Adulsa syrup, Ginger syrup and cake, Visit to a production industry in nearby area (Students are expected to prepare a model of production industry, a visit report and to submit the same at the time of practical examination.

OR

SECB-IB: FUNGAL BIOMASS PRODUCTION SKILL
(MUSHROOM CULTIVATION)

UNIT-I: FUNGAL BIOMASS AS NON CONVENTIONAL FOOD (6 periods)
Introduction, Concept and need, Advantages, disadvantages and Sources of non-conventional food
UNIT-II: MUSHROOM (PLEUROTUS) CULTIVATION (15 periods)
Introduction, Systematic position, thallus structure and fruit body of Pleurotus, Merits of Pleurotus cultivation, Commercial cultivation of Pleurotus, Cultivation details of Pleurotus (Substrate, Soaking, Pasteurization, Spawning, Cropping, Picking and Packing, Flow chart), Pleurotus products fresh and processed
UNIT-III: PRACTICALS ON MUSHROOM (PLEUROTUS CULTIVATION) (8 practicals)
Principle, Requirement, procedure, observations, Harvesting, results and records, Visit to a Mushroom cultivation laboratory in nearby area (Students are expected to prepare a model of Mushroom cultivation laboratory, a visit report and to submit the same at the time of practical examination.

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SKILL ENHANCEMENT COURSE BOTANY
SECB-II

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

SECB-IIA: FUNGAL BIOMASS PRODUCTION FOR BIOCONTROL
(TRICHODERMA CULTIVATION SKILL)

UNIT-I: BIOCONTROL (6 periods)
Introduction, Definition, Biocontrol agents, Need of biocontrol, Concept of biocontrol (ways, limitations and factors affecting success of biocontrol, Environmental health hazards due to pesticides and fungicides), Plant based products (Azadirachtin, Neem cake, Indiara, Pyrethrines, Phermones, Trichoderma etc.)
UNIT-II: TRICHODERMA CULTIVATION (15 periods)
Introduction, Systematic position, thallus structure, Trichoderma as biocontrol agent, Mode of action, Uses, Trichoderma as a commercial biocontrol agent, Cultivation details of Trichoderma
UNIT-III: PRACTICALS ON TRICHODERMA CULTIVATION (8 practicals)
Principle, Requirement, procedure, observations, Harvesting, results and records precautions, Visit to a Trichoderma cultivation laboratory in nearby area (Students are expected to prepare a model of Trichoderma cultivation laboratory, a visit report and to submit the same at the time of practical examination.

OR
SECB-IIB: ALGAL BIOMASS PRODUCTION SKILL
(SPIRULINA CULTIVATION)

UNIT-I: ALGAL BIOMASS AS NON CONVENTIONAL FOOD (6 periods)
Introduction, Concept and need, Advantages, disadvantages and Sources of non-conventional food
UNIT-II: SPIRULINA CULTIVATION FOR SINGLE CELL PROTEIN-SCP (15 periods)
Introduction, Systematic position, thallus structure, Merits of Spirulina cultivation, Methods of cultivation- Small scale cultivation, Mass cultivation, Harvesting of Spirulina, Flow chart of Spirulina cultivation, Limiting factors for Spirulina cultivation, Spirulina products –Powder, Biscuits, Tablets
UNIT-III: PRACTICALS ON SPIRULINA CULTIVATION (8 practicals)
Principle, Requirement, chemicals, Sample or Inoculum of Spirulina, procedure (steps involved in Spirulina cultivation), observations, Harvesting, results and records, precautions Visit to a Spirulina cultivation laboratory in nearby area (Students are expected to prepare a model of Spirulina cultivation laboratory, a visit report and to submit the same at the time of practical examination.

Suggested Readings for SECB-I&II:
Vijaya Khader (1993): Mushrooms for livelihood, Kalyani publishers, Ludhiana-141 008, Page 1-64
Patil B.A. et al (2004): Applied Botany, Sunny publication, Pune, Page 1-214
Dhumal K.N. et al (1998): Plant Diversity& Plants and Human welfare, Nirali prakashan, Pune Page 1-296
Aneja K.R. (1993): Experiments in Microbiology, Plant pathology, Tissue culture and Mushroom cultivation, Vishawa prakashan
Aneja K.R. (1993): Experiments in Microbiology, Plant pathology, Tissue culture and Mushroom cultivation, Vishawa prakashan

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SECB-I&II

END OF SEMESTER EXAMINATION (ESE)

Maximum Marks: 25

SEAT NO:

MARK SHEET

Sr. No.	END OF SEMESTER EXAMINATION (ESE)	Maximum Marks	Obtained Marks
1	Skill Work report submission	10	
2	Over all skill judgement	10	
3	Skill Work presentation	05	
4	Total Marks	25	

Name & Signature of:

Examiner- 1:

Examiner- 2:

(With effect from Academic Year 2017-2018)

Swami Ramanand Teerth Marathwada University Nanded
Choice Based Credit System (CBCS) Course Structure (New scheme)
CLASS: B. Sc. SECOND YEAR
Subject : Electronics - Semester III& IV
(W. e. f. June 2017)

Semester	Paper No.	Name of the Course	Instruction Hrs/ week	Total periods	CA	ESE	Total Marks	Credits
III	CCEIII (Section A)	Amplifiers, Oscillators & Multivibrators (P-VI)	03	45	10	40	50	2
	CCE III (Section B)	Fundamentals of Microprocessors (P-VII)	03	45	10	40	50	2
	CCEP II (Annual Pattern Section A)]	P-X: Practical's based on P-VI	03	24	05	20	25	1
		Practical's based on P-VIII	03	24	05	20	25	1
	CCE S I (Section A)	SEC I (One SEC from any optional)	03	45	25	25	50	2
IV	CCE IV (Section A)	Op-Amp, It's Applications & Some Specilized ICs Theory Paper (P-VIII)	03	45	10	40	50	2
	CCEIV (Section B)	Microprocessor Interfacing (P-IX)	03	45	10	40	50	2
	CCEP III (Annual Pattern Section A)	P-XI : Practical's based on P-VII	03	24	05	20	25	1
		Practical's based on P-IX	03	24	05	20	25	1
	CCESII (Section B)	SEC II (One SEC from any optional)	3	45	25	25	50	2
Total credits semester III and IV								16

CCE: Core course Electronics   SEC: Skill Enhancement Course   ESE: End Semester Examination   C. A.: Continuous Assessment (Internal)
Note : ESC of CCEP II, CCEP III, SEC I and SEC II should be Evaluated at annual

Swami Ramanand Teerth Marathwada University Nanded
Choice Based Credit System (CBCS) Course Structure (New scheme)
B. Sc. Second Year (Semester – III)
Semester Pattern effective from June -2017
Electronics
CCE III (Section A)
Amplifiers, Oscillators & Multivibrators (P-VI)

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

Unit I: Load Lines And DC Bias Circuits   (14 Periods)
DC Load line, Q-Point and Maximum Undistorted Output, Need for Biasing a Transistor, Factors Affecting Bias Variations, Stability factor, Beta Sensitivity, Stability Factor for CB and CE Circuits, Base Bias with Emitter Feedback, Base Bias with Collector Feedback, Base Bias with Collector and Emitter Feedback, Voltage Divider Bias, Load Line and output Characteristics, AC Load line,
(Numerical Problems)   (Book-5)

Unit II: Small Signal Amplifiers   (11 Periods)
h-parameters, An equivalent circuit for the BJT, Transconductance Model, Analysis of CE Amplifier, CB Amplifier, CC Amplifier using h-parameters, Gain in decibels
(Numerical Problems)

Unit III: Sine Wave Oscillators   (10Periods)
Introduction to Positive and Negative Feedback, Requirement of an Oscillator, Barkhausen Criterion, Hartley Oscillator, Colpitt's Oscillator, R-C Network, Phase Shift Oscillator, Wien Bridge Oscillator (Circuit diagram, Working, Expression of Frequency and Condition for Oscillations)
(Numerical Problems)

Unit IV: Multivibrators And Sweep Circuits(10 Periods)
Transistor as a Switch, Transistorized Astable Multivibrator, Transistorized Monostable Multivibrator, Transistorized Bistable Multivibrator (working and waveforms), Introduction to Sweep Circuits, Sweep Voltage Waveforms, Exponential Sweep, RC Ramp Generator, (Numerical Problems)

References:
1. Introduction To Electronics
        -K. J. M. Rao (Oxford and IBH Publishing Company).
2. Solid State Pulse Circuits
        -David A. Bell (4/e, Prentice-Hall of India Private Ltd.)
3. Electronic Fundamentals And Applications
        -John D. Ryder (Prentice-Hall of India Private Ltd.)
4. Electronics And Radio Engineering
        -M.L.Gupta (Dhanpat Rai and Sons)
5. Basic Electronics (Solid State) [Multicolour Illustrative Edition]
        - B. L. Theraja (S. Chand & Company Ltd)
6. Electronic Principles
   – A.P. Malvino (TMH Publishing Company) Third Edition
7. Principles of Electronics (Vol. II)
   -   B.V. Narayanarao (Second Edition) Published by New Age International (P) Ltd.

Swami Ramanand Teerth Marathwada University Nanded
Choice Based Credit System (CBCS) Course Structure (New scheme)
B. Sc. Second Year (Semester – III)
Semester Pattern effective from June -2017
Electronics
CCE III (Section B)
Fundamentals of Microprocessors (P-VII)

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

Unit I: Introduction To Microprocessor Intel 8085   (12 Periods)
Semiconductor Memories (RAM, ROM, PROM, EPROM, EEPROM), Block Diagram of Microcomputer (Microprocessor Based System), Block Diagram of Intel 8085, Function of Each Block, Functional Pin Diagram of Intel 8085, Features of Intel 8085

Unit II: Instruction Set Of Intel 8085   (12 Periods)
Instruction Format (1 byte, 2 byte, 3 byte), Addressing Modes, Classification of Instructions, Instruction Set of 8085

Unit III: Programming And Interrupts of 8085   (13 Periods)
Simple Programs Based on Data Transfer, Arithmetic, Logical, Branching and Machine Control Instructions, Interrupts:-Hardware Interrupts, Software Interrupts, Priority Structure of 8085 Interrupts

Unit IV: Introduction To Microprocessor Intel 8086   (08 Periods)
Block Diagram of Intel 8086, Function of Each Block, Functional Pin Diagram of Intel 8086, Features of Intel 8086

References:
1. Fundamentals Of Microprocessors And Microcomputers
        -B. Ram (6/e, Dhanpat Rai, Publications)
2. Microprocessor
        -Borole and Vibhute (2/e, Technova Publications)
3. Microprocessor Architecture, Programming And Applications With The 8085
        -Ramesh S. Gaonkar (3/e, Penram International Publishing)
4. 8085 Assembly Language Programming
        -Lance A. Leventhal (McGraw Hill International Editions)
5. Advanced Microprocessor
        -Ajay K. Ray & Kishor M. Bhurchandi (TMH Publication, 7th Revised Edition)
6. Microprocessors & Interfacing
        -Douglas V. Hall & S S S P Rao (TMH Publication, 3rd Edition,2012)

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure (New scheme)
B. Sc. Second Year (Semester – IV)
Semester Pattern effective from June -2017
Electronics
CCE IV (Section A)
Op-Amp, It's Applications & Some specialized ICs **(P-VIII)**

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

Unit I: Operational Amplifier   (13 Periods)

Theory of Differential Amplifier, Block Diagram of Op-Amp, Schematic Symbol, Ideal Characteristics, Input Offset Voltage, Input Offset Current, Input Bias Current, Input Impedance, Output Impedance, Open Loop Gain, CMRR, Slew Rate, Numerical Problems

Unit II: Applications of Operational Amplifier   (13 Periods)

Inverting Amplifier, Non-inverting Amplifier, Op-Amp as Adder, Op-amp as Subtractor, Op-Amp as Integrator, Op-Amp as Differentiator, Op-Amp as Comparator, Op-Amp as Schmitt's Trigger, Solving Differential Equation, Numerical Problems

Unit III: Active Filters   (13 Periods)

Introduction, First Order Low-Pass Butterworth Filter, Second Order Low-Pass Butterworth Filter, First Order High-Pass Butterworth Filter, Second Order High-Pass Butterworth Filter, Numerical Problems

Unit IV: Specialized ICs   (06 Periods)

Block Diagram of IC555, IC 555 as Astable Multivibrator, IC555 as Monostable Multivibrator, IC566 (Pin Diagram, Block Diagram and Use as VCO), Numerical Problems

References:

1. Op-Amps And Linear Integrated Circuits
     `-Ramakant Gayakwad (Prentice Hall of India Private Limited)
2. Electronic Fundamentals And Applications
     -John D. Ryder (Prentice Hall of India Private Limited)
3. Electronic Principles
     -A. P. Malvino (TMH Publishing Company)
4. Electronics and Radio Engineering
     -M.L.Gupta (Dhanpat Rai and Sons)

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure (New scheme)
B. Sc. Second Year (Semester – IV)
Semester Pattern effective from June -2017
Electronics
CCE IV (Section B)
Microprocessor Interfacing **(P-IX)**

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

Unit I: Basic Interfacing Concepts   (10 Periods)
Introduction, memory mapped I/O scheme, I/O mapped I/O scheme, <u>Data Transfer Schemes</u>:- Synchronous, Asynchronous, Interrupt Driven and DMA

Unit II: Interfacing Chips   (15 Periods)
Schematic Diagram (Functional Pin Diagram), Block diagram and Operating modes of the ICs- 8253, 8255, 8259, 8257, Control registers of 8255 and 8253

Unit III: Microprocessor Applications   (10 Periods)
Demultiplexing of AD_7-AD_0 bus, Interfacing concepts of I/O devices using decoder (74LS138), Chip Select logic, Generation of $\overline{MEMR}$, $\overline{MEMW}$, $\overline{IOR}$ and $\overline{IOW}$ signals, Tristate buffer (74LS244), Latches (74LS373), Interfacing switches, LED, relays

Unit IV: Data Converters   (10 Periods)
Interfacing of ADC 0808 & DAC 0808 using 8255

References:
1. Fundamentals Of Microprocessors and Microcomputers:
     - B. Ram (Dhanpat Rai Publications)
2. Microprocessor Architecture, Programming And Applications With 8085:
     - Ramesh S. Gaonker (3/e, Penram International Publishing)
3. Introduction to 8085, 8086 Microprocessors And Peripherals
     - K. M. Bakwad & A. K. Deshmane (Nikita Publcations, Latur)
4. Microprocessor:
     - Borole and Vibhute (2/e, Technova Publications)

Swami Ramanand Teerth Marathwada University Nanded
Choice Based Credit System (CBCS) Course Structure (New scheme)
B. Sc. Second Year (Semester – III &IV)
Semester Pattern effective from June -2017
Electronics
Practical Paper P-X: *Practical's based on P-VI & P-VIII*
(Annual practical's Based on [CCE III& IV (Section A & B))

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

Note:
1. Every student must perform at least TEN experiments (At least FIVE from each group)
2. Use graphs wherever necessary

List of Experiments:
Group I:
1. Op-Amp as Inverting Amplifier (DC Gain Verification)
2. Op-Amp as Non-inverting Amplifier(DC Gain Verification)
3. Op-Amp as Inverting Amplifier (Study of Frequency Response, Gain & -3db Band Width)
4. Op-Amp as Non-inverting Amplifier (Study of Frequency Response, Gain & -3db Band Width)
5. Op-Amp as Adder
6. Op-Amp as Subtractor
7. Op-Amp as Integrator
8. Op-Amp as Schmitt's Trigger
9. Op-Amp as Comparator
10. Op-amp as Analog Computer
11. IC555 Timer as Astable Multivibrator (Measurement of Pulse Width , Space Width, Time Period, Frequency and Mark to Space Ratio)
12. VCO using IC566 (Measurement of Frequency with Change in Control Voltage)

Group II:
13. Study of Transistorized CE Amplifier (Frequency Response, Gain & -3db Band Width)
14. Transtorized Hartely oscillator (Measurement of Frequency and Amplitude of Waveforms)
15. Transtorized Colpitt's Oscillator (Measurement of Frequency and Amplitude of Waveforms)
16. Transtorized Phase Shift Oscillator (Measurement of Frequency and Amplitude of Waveforms)
17. Wein Bridge Oscillator using Op-Amp (Measurement of Frequency and Amplitude of Waveforms)

18. Transistorized Astable Multivibrator.(Measurement of Pulse Width, Space Width, Time Period, Frequency and Duty Cycle)
19. Transistorized Mono stable multivibrator (Measurement of Gate Width)
20. Transistorized Bistable Multivibrator
21. RC Ramp Generator using Transistor. (Measurement of Rise Time, Fall Time and Frequency)

Paper-XI
LAB-III
(Practical Based On Papers **VII** And **IX**)

(**50** Marks)

Note:
1. Every student must perform at least 10 experiments.
2. Use flow-chart wherever necessary.

List of Experiments:
1. ALP to Transfer a block of data from one location to another location
2. ALP for addition of two byte and result 8-bit
3. ALP for addition of two byte and result 16-bit numbers
4. ALP for subtraction of two bytes
5. ALP for decimal addition of 8 bit numbers
6. ALP for 1's complement of 8-bit and 16-bit numbers
7. ALP to find 2's complement of 8-bit and 16-bit numbers
8. ALP for shifting of 8-bit number:
    a. Left by one bit position
    b. Left by two bit position
9. ALP to find sum of series of 8-bit numbers
10. ALP to find multiplication of two 8-bit numbers
11. ALP to find division of two 8-bit numbers
12. ALP for masking off:
    a. Four LSBs of 8-bit numbers
    b. Four MSBs of 8-bit numbers
13. ALP to find smallest number of the series
14. ALP to find largest number of the series
15. ALP to generate square wave using IC 8255. Determine frequency
16. Interfacing of 7-segment display with 8085 using IC 8255

Choice Based Credit System (CBCS) Course Structure (New scheme)
B. Sc. Second Year (Semester – IV)
Semester Pattern effective from June -2017
Electronics
CCESI (Section A)
Skill Enhancement Course **SEC I**

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

Skill Enhancement Course-I (Credit:2) B. Sc. III SEM

Physics Workshop Skill	Maximum Marks: 50
Credit: 02	C. A. (Internal): 25
45 Lectures (Theory + Lab)	ESE OR Skill Exam:25
Maintain project file or Dissertation to check Analytic skills/ problem solving in skill exam	

UNIT-I: Mesaruement Skill : Measureing units, conversion to SI and CGS. Familiarization with meter scale, vernier caliper, Screw gauge and their vtility. Measure the dimension of solid bulk, volume of cylindrical beaker / glass, diameter of thin wire, thickness of metal sheet etc. **(15 Lectures)**

UNIT-II: Electric and Electronic Skill : Use of multimeter, soldering of electrical circuits having discrete components (R, L, C, diode) and ICS on PCB. Operation of oscilloscope. Making regulated power supply.l Timer circuit, electronic switch using transistor and relay. **(15 Lectures)**

Hands on Exercises:
(**15 Lectures)**
1. Meassurement of ac and dc voltages/ currents by using analogue multimeter
2. Measurement of ac and dc voltages / currents by using digital multimeter
3. Testing of electronic components by using multimeter such as diodes, transistors FETs etc.
4. Measurement of voltage, time period and frequency using CRO.
5. Measurement of rise and fall time using CRO.
6. Study wave forms generated by a function generator.

Reference Books:

1. A text book in Electrical technology – B L Theraja – S. Chand and Company.
2. Performance and design of AC machines – M.G. Say, ELBS Edn.
3. Mechanical workshop practice, K.C.John, 2010, PHI Learning Pvt. Ltd.
4. Workshop processes, Practices and Materials, Bruce J Black 2005, 3rd Edn., Editor Newnes [ISBN : 0750660732]
5. New Engineering Technology, Lawrence Smyth/Liam Hennessy, The Educational Company of Ireland [ISBN : 0861674480]

Swami Ramanand Teerth Marathwada University Nanded
Choice Based Credit System (CBCS) Course Structure (New scheme)
B. Sc. Second Year (Semester – IV)
Semester Pattern effective from June -2017
Electronics
CCES II (Section B)
Skill Enhancement Course SEC II

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

Skill Enhancement Course-I (Credit: 02) B. Sc. III SEM

Optics and Lasers	Maximum Marks: 50
Credit: 02	C. A. (Internal): 25
45 Lectures (Theory + Lab)	ESE OR Skill Exam:25
Maintain project file or Dissertation to check Analytic skills/ problem solving in skill exam	

UNIT-I: Semiconductor Sources and Detectors: Construction of LED**,** Working principle of LED, Types of LED, Construction of LDR, Working principle of LDR, Construction of photovoltaic cell & its working principle. **Polarization of Light:** Polarization of transverse wave, Plane of polarization, Brewster law, Malus law, specific rotation, Laurent's half shade polarimeter.
(10 Lectures)

UNIT-II: Refraction Through Lenses: Types of lenses, The sign convention, principal foci, Deviation produced by a thin lens, Power of a lens, Principal planes and focal planes, Dispersion by prism, Dispersive power, Huygens eyepiece, Ramsden eyepiece.
(10 Lectures)

UNIT-III: Laser: Lasers, spontaneous and stimulated emission, Theory of laser action, Einstein's coefficients, Light amplification, Characterization of laser beam, He-Ne laser, Semiconductor lasers.   (**10 Lectures)**
Hands on Exercises: (15 Lectures)
1. Determination of focal length of a biconvex lens.
2. Determination of radius of curvature of a lens using a spherometer.
3. Determination of power of a lens.
4. Determination of the grating radial spacing of a compact disc (CD) by reflection using a laser source.
5. To find the width of the slit using diffraction pattern obtained by a laser.
6. To find angle of polarization using Brewster law.
7. Study the characteristics of solid state laser.
8. Study the characteristics of LDR.

Reference Books:

1. Fundamentals of optics, F. A. Jenkins & H. E. White, 1981**,** Tata McGraw Hill.
2. LASERS: Fundamentals & applications, K. Thyagrajan & A. K. Ghatak, 2010, Tata McGraw Hill.
3. A Text Book of Optics**,** Brij Lal & Subramanyam, 1989, S Chand & Co
4. Laser & Non- linear optics, B. B. Laud, New Age International Publisher

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure (New scheme)
B. Sc. Second Year (Semester – IV)
Semester Pattern effective from June -2017
Electronics
CCESI (Section A)
Skill Enhancement Course **SEC II**

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

Skill Enhancement Course-II (Credit:2) B. Sc. IV SEM

Electrical Circuits & Network Skills	Maximum Marks: 50
Credit: 02	C. A. (Internal): 25
45 Lectures (Theory + Lab)	ESE OR Skill Exam:25
Maintain project file or Dissertation to check Analytic skills/ problem solving in skill exam	

UNIT-I: Basic Electricity principles : Voltage, current, Resistance, and power. Ohm's law. Series, parallel and series parallel combinations. AC and DC electricity, Familiarization with multimeter, voltmeter and ammeter.
Basic electric circuit elements and their combination.

(20 Lectures)

UNIT-II: Solid state Devices   : Resistors, inductors and capacitors. Diode and rectifiers. Components in series or in shunt. Response of inductors and capacitors with DC or AC sources.
(10 Lectures)

Hands on Exercises:
(**15 Lectures)**
1. To Study charging and discharging of a condenser through resistor R.
2. Determinations of parameters of Op-Amp.
3. Study of transducers.(Thermistor, LDR, Photodiode photo transistor etc.)
4. Study frequency response of a microphone.
5. Soldering Skills.
6. Trouble Shooting of simple electronic circuits.
7. Design and development of low voltage power supply.
8. Solving differential equation by using Op-Amp.
9. Study of response of inductors and capacitors with DC or AC sources.
10. Study of capacitance by using LCR meter.

Reference Books:
1. Electrical circuits, K.A. Smith and R.E. Alley, 2014, Cambridge University Press.
2. A text book in Electrical Technology – B L Theraja – S Chand & Co.
3. A text book of Electrical Technology – A K Theraja
4. Performance and design of AC machines – M G Say ELBS Edn.

OR
Skill Enhancement Course-II (Credit: 02) B. Sc. IV SEM

Renewable Energy & Energy Harvesting	Maximum Marks: 50
Credit: 02	C. A. (Internal): 25
45 Lectures (Theory + Lab)	ESE OR Skill Exam:25
Maintain project file or Dissertation to check Analytic skills/ problem solving in skill exam	

UNIT-I: Solar Energy : Solar Energy, its importance, storage of solar energy, solar pond, non convective solar pond, applications of solar pond and solar energy, solar water heater, flat plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning. Need and characteristics of photovoltaic (PV) systems, PV models and equivalent circuits, and sun tracking systems. **(15 Lectures)**

UNIT-II: Piezoelectric Energy harvesting : Introduction, physics and characteristics of piezoelectric effect, materials and mathematical description of piezoelectricity, Piezoelectric parameters and modeling piezoelectric generators, piezoelectric energy harvesting applications, Human power. **(15 Lectures)**

Hands on Exercises: (**15 Lectures)**
Demonstrations and Experiments
1. Demonstration of Training modules on Solar Energy, wind energy, etc.
2. Conversion of vibration to voltage using piezoelectric materials.
3. Conversion of thermal energy into voltage using thermoelectric modules.
4. Teacher can allot any exercise related with topic.

Reference Books:
1. Non-conventional energy sources, B.H. Khan, McGraw Hill.
2. Solar energy, Suhas P Sukhative, Tata McGraw – Hill Publishing Company Ltd.
3. Renewable Energy, power for a sustainable future, Godfrey Boyle, 3rd Edn., 2012, Oxford University Press.
4. Renewable Energy sources and Emerging Technologies, Kothari et. AI, 2nd Edition, PHI Learning.
5. Solar Energy : Resource Assesment Handbook, P Jayakumar, 2009.
6. J. Balfour, M. Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA)
7. http://en.wikipedia.org/wiki/renewable_energy.

Swami Ramanand Teerth Marathwada University, Nanded

B. O. S. IN CHEMISTRY

B. SC. SECOND YEAR (CHEMISTRY)

SEMESTER-III & IV

CBCS Course

Effective from JUNE - 2017

Swami Ramanand Teerth Marathwada University, Nanded
Choice Based Credit System (CBCS) Course Structure
Faculty of Science
B. Sc. Second Year Syllabus
Semester Pattern effective from June 2017
Subject: Chemistry

Semester	Course No.	Name of the Course	Instruction Hrs/ week	Total period	CA (Int.)	ESE (Ext.)	Total Marks	Credits
III	CCC III (Section A)	Theory Paper-VI Organic+Inorganic Chemistry (P-VI)	03	45	10	40	50	02
	CCC III (Section B)	Theory Paper-VII Physical+Inorganic Chemistry (P-VII)	03	45	10	40	50	02
	CCCP- II [CCC III & IV (Section A)]	Practical's based on P-VI & P-VIII (P-X)	04 04	Practicals 08 08	05 05	20 20	25 25	01 01
	SECC I	SEC I (Anyone Skill from optional)	02+01=03	45	25	25	50	(02)*
IV	CCC IV (Section A)	Theory Paper-VIII Organic+Inorganic Chemistry (P-VIII)	03	45	10	40	50	02
	CCC IV(Section B)	Theory Paper-IX Physical+Inorganic Chemistry (P-IX)	03	45	10	40	50	02
	CCCP III [CCC III & IV (Section B)]	Practical's based on P-VII & P-IX (P-XI)	04 04	Practicals 08 08	05 05	20 20	25 25	01 01
	SECC II	SEC II (Anyone Skill from optional)	02+01=03	45	25	25	50	(02)*
Total credits semester III and IV								**12(04)***

CCC: Core Course Chemistry, **CCCP:** Core Course Chemistry Practical, **ESE:** End of Semester Examination,

CA: Continuous Assessment, **SECC:** Skill Enhancement Course Chemistry.

Distribution of Credits: 80% of the total Marks for ESE and 20% for CA.

- **CA of Marks 10 :** 10 Marks for test.
- **CA of 25 Marks :** 15 Marks for Seminar & 10 Marks for test.

B. Sc. Second Year: Semester-III

Paper-VI, (CCC-III, Section A)

Organic & Inorganic Chemistry

Credits:02   **Periods: 45**

Part I (Organic Chemistry)

Unit:-I

Name Reaction with Mechanism   **10**

[A] Condensation reactions of Aldehydes and Ketones.

1. Benzoin Condensation Reaction.

2. KnoevengeI Reaction.

3. Mannich Reaction

4. Perkins Reaction,

5. Reformatsky reaction.

6. Gatterman Koch reaction.

7. Gatterman synthesis.

[B] Reduction reactions

1. Clemmensen Reduction Reaction.

2. Meervin-Pondorof Verly reduction reaction.

3. Reduction with $LiAlH_4$.

4. Reduction with $NaBH_4$.

[C] OXIDATION REACTIONS.

1. Baeyer- Villiger Oxidation Reaction.

2. Oppenauer oxidation.

Unit:- II

Aromatic Carboxylic and Sulphonic Acids.   **06**

1. Introduction and Classification of Aromatic Carboxylic Acids.

2. Synthesis and Chemical Reactions of Following Acids.

[A] Benzoic Acid.

1. Preparations From: (a) Phenyl Cyanide, (b) Toluene.

2. Reactions of Benzoic Acids**:**

a) Acyl halide formation b) Reduction. C) Nitration.

[B] Anthranilic Acid:

1. Preparations From : (a) Phthalimide. b) O-nitroToluene.

2. Reactions of Anthranilic Acids:

a) Action of heat, b) Nitrous Acid, c) Action of acetic anhydride/acetyl chloride.

[C] Salicylic Acid:

1. Preparations From: (a) Kolbe's reaction. (b) Reimer-Tiemann reaction.

2. Reactions of Salicylic Acids:

a) Bromination, b) Nitration, c) Decarboxylation, d) Reaction with Zn-dust.

[D] Phthalic Acid

1. Preparations From: (a) o-xylene. (b) Naphthalene.

2. Reactions of Phthalic Acids:

a)Action of heat. b) Action of $PC1_5$. C) Action of ethanol.

[E] Benzene Sulphonic Acid.

1. Introduction.

2. Preparation of benzene sulphonic acid from benzene with mechanism.

3. Chemical Reactions of benzene sulphonic acid,

a) Salt formation b) formation of sulphonyl chloride,

c) formation of sulphonic ester and amide.

4. Replacement of sulphonic group by:

a) Hydroxyl group. b) cyano group, c) Hydrogen atom d) NH_2 –group.

Unit:- III

[A] Introduction to Organometallic Compounds.   **09**

1. Organomagnesium Compounds:

1. Preparation of Methyl magnesium bromide.

2. Synthetic applications of Methyl magnesium bromide (CH_3MgBr) : Hydrocarbons, Ethanol, 2-propanol, 2-methyl-2-propanol, Ethanal, 2-propanone, ethanoic acid, Methanamine, Acetonitrile, Ethyl ethanoate..

2. Organo Lithium Compounds.

1. Preparation of methyl lithium from methyl iodide.

2. Synthetic application of Methyl lithium(CH_3Li): Methane, Ethanol, 1-propanol, 2-propanol.

3. Organo Zinc Compounds:

1. Preparation of diethyl zinc from ethyl iodide.

2. Synthetic application of diethyl zinc [$(C_2H_5)_2Zn$]: Methane, 2-propanone, Ethanol, 2-propanol.

[B] Organic Synthesis via Enolates.

1. Introduction, Acidity of alpha hydrogen.

2. Synthesis of Ethyl Acetoacetate. [Claisen Condensation Reaction with Mechanism]

3. Ketol-EnolTautomerism of ethyl acetoacetate.

4. Synthetic Applications of Ethyl Acetoacetate.

5. Synthesis of Enamines, Acetylation and Alkylation of Enamines.

Unit:- IV

Oils, Fats, Soaps and Detergents   05.

A. Introduction, chemical nature, General physical properties and

1. General chemical properties.

a) Hydrolysis

b) hydrogenation

c) hydrogenolysis

d) trans-esterification

e) Rancidity and autoxidation.

f) Analysis of Fats and Oils.

i) Saponification number (Saponification value)

ii) Iodine number (Iodine value)

iii) Acid value

iv) Reichert Meissl value (R. M. value)

B] SOAPS

1. Introduction,

2. Manufacture of soaps by

i) Kettles process

ii) Hydrolyser process.

iii) Cleansing action of soap.

C] Synthetic Detergents.

1. Introduction,

2. Synthetic detergent classification,

i) Anionic detergent

ii) Cationic detergents

iii) Non ionic detergents.

3. Synthetic detergent versus soaps, Soft versus Hard detergents.

Part II (Inorganic Chemistry)

Unit:-V

[A] Theory of Qualitative Analysis **09**

a) Introduction: Definition of qualitative analysis, macro, micro and semimicro

qualitative analysis, radicals, acidic and basic radicals.

b) Role of sodium carbonate extract in qualitative analysis.

c) Interfering radicals. Removal of interfering radicals such as oxalate, borate, fluoride and

phosphate.

d) Use of solubility product, common ion effect and complex ion formation in the analysis of

basic radicals:

i) Separation of II_A and II_B, ii) Separation of II and III_B.

iii) Separation of III_A and III_B, iv) Separation of Zn^{++} and Mn^{++}.

v) Separation of Co^{++} and Ni^{++} vi) Separation of Fe^{+++} and Al^{+++}.

vii) Separation of Cu^{++} and Cd^{++}.

e) Use of organic reagents in qualitative analysis.

i) 8-Hydroxy quinoline for aluminium ii) α-Benzoinoxime for copper.

iii) Dimethylglyoxime for Nickel iv) 1,10-Phenonthroline for Iron.

v) α-Nitroso-β-naphthol for cobalt.

[B] Non-aqueous Solvents **06**

a) Introduction

b) Classification of Solvents.

c) Water as a universal solvent

b) Physical properties of solvent: Dipole moment, Dielectric Constant, Trouton's Constant,

Viscosity. Melting Point & Boiling Point.

c) Reactions in liquid ammonia as solvent : Auto ionization, Acid-Base,

Ammonolysis, Precipitation and ammonation.

d) Reactions in liquid SO_2 :

Autoionization, Acid-Base, Solvolysis, Precipitation and Solvation.

Reference books:

1. Organic chemistry by Morrison and Boyd, Print ice hall.

2. Organic chemistry by L.G. Wade. Print ice hall.

3. Organic chemistry Vol. I, II, III by S. M. Mukharji, S. P. Sing and R. P. Kapoor

4. Fundamental of organic chemistr y b y Solomon, John willey

5. A Text book of organic chemistry by Bahl and Bahl.

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B. Sc. Second Year: Semester-III
Paper-VII, (CCC III, Section B)
Physical & Inorganic Chemistry

Credits:02   **Periods: 45**

Part I (Physical Chemistry)

Unit :- I   **10.**

Atomic Structure and Wave Mechanics

1.1 Planck's quantum theory.

1.2 Photoelectric effect, explanation on the basis of quantum theory.

1.3 Compton Effect: Statement, explanation.

1.4 de-Broglie hypothesis; derivation of de-Broglie equation, explanation.

1.5 Davisson-Germer experiment.

1.6 Heisenberg's uncertainty principle: Statement, explanation.

1.7 Schrodinger wave equation; Derivation in time independent form and

Laplacian operator form, Physical significance of wave function (Ψ) and (Ψ_2).

1.8 Numerical on photoelectric effect, de-Broglie equation, Heisenberg's uncertainty

principle.

Unit :- II   **05**

Thermodynamics:

2.1 Introduction to First law of thermodynamics.

2.2 Joule's law. Joule-Thomson effect. Joule-Thomson coefficient and inversion

temperature.

2.3 Need for second law thermodynamics, different statements of second law of

thermodynamics.

2.4 Carnot's cycle and its efficiency. Carnot's theorem.

2.5 Numerical on efficiency of Carnot cycle.

Unit:- III

Concept of entropy: **06**

3.1 Introduction, Definition, Mathematical Expression, Unit.

3.2 Entropy as a state function.

3.3 Entropy change in Physical transformations: (i) Fusion of a solid. (ii) Vaporization of a

liquid. (iii) Transition from one crystalline form to another.

3.4 Entropy changes for an ideal gas as a function of V and T and as a function of P and T.

3.5 Entropy changes of an ideal gas in different processes.

3.6 Physical significance of entropy.

3.7 Numerical on entropy change in physical transformations and entropy changes of an ideal gas in different processes.

Unit:- IV 09.

Phase equilibrium

4.1 Phase rule, Statement and explanation of the terms-phase, component and degree of freedom.

4.2 Phase equilibria of one component system: Water system, Sulphur system and CO_2 system.

4.3 Phase equilibria of two component system: Pb-Ag system, desilverisation of lead, KI-H_2O system.

4.4 Partially miscible liquids: Critical solution temperature, upper critical solution temperature, lowers critical solution temperature. Phenol-water, triethylamine-water, nicotine-water systems. Effect of impurities on critical solution temperature.

<center>Part II (Inorganic Chemistry)</center>

Unit:- V

[A] Nuclear Chemistry: 10

a) Introduction, composition of nucleus and nuclear size.

b) Classification of nuclides: Isotopes, isobars, isotones, isotones and isomers.

c) Nuclear Stability: Odd and even number of protons and neutrons, N/Z ratio,

magic number, packing fractions (Numerical), mass defect (Numerical),

nuclear binding energy (Numerical) and mean nuclear binding energy (Numerical).

d) Release of nuclear energy:

i) Nuclear fission reaction, nuclear fuels and plutonium bomb.

ii) Nuclear fusion reaction, the energy of sun, hydrogen bomb.

e) Definition of radioactivity, characteristics of α, β, and γ particles, group displacement law.

f) Application of radioisotopes in medicine, agriculture, industry, and carbon dating.

[B] Theory of Gravimetric Analysis   **05**

a) Introduction , definition of gravimetric analysis.

b) Steps involved in gravimetrc analysis

c) Precipitation, Conditions for Prcipitation

d) types of precipitates.

e) Factors affecting precipitation such as temperature and pH,

Solubility and Solubility Product.

f) Different Steps involved in gravimetric analysis:

i) Precipitation, ii) Digestion , iii) Filtration & Washing, iv) Drying,v) Ignition

& Inceneration, vi) Weighing.

Reference Books:

1. Physical Chemistry by G. M. Barrow (Tata Mc-Graw Hill publishing Co., Ltd.)

2. Elements of Physical Chemistry by S. Glasstone & D. Lewis (D.van nostrand co. Inc.)

3. Physical Chemistry by W. J. Moore (Orient Longman).

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Credits:02   **Periods: 45**

Part I (Organic Chemistry)

Unit:-I   **08**

Stereochemistry

1. Introduction

2. Concept and Types of isomerism. (a) Structural isomerism (b) Stereo isomerism.

3. Types of structural isomerisin [Chain, Position, Functional, Metamerism, Tautomerism]

4. Types of Stereoisomerism [Conformational (n-butane) and Configurational]

5. Geometrical isomerism: Cis -Trans and E and Z system of nomenclature.

6. Optical isomerism**:**

a) Concept of asymmetric carbon atom, Chiral centre.

b) Dextro and Laevo forms, Racemic mixture.

c) Element of symmetry [plane, Centre, and Axis]

d) Concept of Diastereoisomers.

e) Racemic modification. (with one example)

f) Resolution (Concept) (with one example)

g) Walden inversion. (with one example)

h) Relative Configuration and Absolute configuration.[D,L and R,S notations]

Unit:-II   **08**

Carbohydrates.

1. Introduction.

2. Classification and Nomenclature

3. Reactions of Monosaccharide's (Glucose and Fructose)

a) Addition reactions b) Ether formation

c) Reduction of glucose d) Oxidation of glucose

e) Osazone formation with mechanism

4. Open and cyclic structure of glucose

5. Determination of ring size

6. Mutarotation with Mechanism.

7. Epimerization.

8. Cyclic Structure of D-glucose.(supporting evidence for six member ring)

9. Interconvertions:

a) Glucose to Fructose.

b) Fructose to Glucose.

c) Glucose to Mannose.

d) Glucose to Arabinose (Ruff Degradation)

e) Arabinose to Glucose (Kiliani synthesis)

10. Pyranose Structure of Glucose.

11. Manufacturing of sucrose (sugar) from sugar cane.

Unit:-III   **08**

Nitrogen Containing Organic Compounds.

A] Aromatic Nitro Compounds.

1. Introduction, Nomenclature,

2. Preparation of Nitrobenzene from benzene

3. Physical and Chemical properties of Nitrobenzene.

4. Electrophilic substitution reactions.

5. Reductions: a) in acidic medium. b) In neutral medium.

c) In alkaline medium. d) Electrolytic reduction.

B] Aromatic amines:

1) Introduction, Classification, Nomenclature,

2) Methods of preparations of aniline from

i) chlorobenzene ii) phenol

iii) nitrobenzene iv) from phthalimide

3) Chemical properties.

i) Diazotization reaction. ii) Action of carbon disulphide.

iii) Action of benzoyl chloride. iv) Formation of Schiff's base.

v) Carbylamine reaction. vi)Formation of p-nitroacetanilide

4. Effect of substituent (-NO_2, -OCH_3, -CH_3)on the basicity of aniline.

C] Diazomethane

1. Introduction.

2. Methods of preparations

i) From N-nitroso-N-methylurethane

ii) From nitrous oxide and methyl lithium

3. Reactions of Diazomethane

i) Action of heat ii) Reaction with mineral acid

iii) Reaction with phenol iv) Reaction with ethanol and ethanamine

v) Ring expansion (cyclopentanone to cyclohexanone)

D] Urea:

1. Synthesis of urea by a) Wohlers methods and b) From CO_2.

2. Reactions:

a) Action of heat b) Action of nitrous acid

c) Hydrolysis d) Action of thionyl chloride

e) Action of formaldehyde f) Action of hydrazine

g) Action of acetyl chloride h) Salt formation.

Unit:-IV   06

Applications of Reagents Iɴ Organic Synthesis.

A] Osmium Tetraoxide [OsO_4]

1. Introduction, Preparation

2. Reactions:

 a) In the formation of Cis-l,2-diol, b)Acralaldehyde to glyceraldehyde,

c) Cis- hydroxylation of maleic acid, d) 9, 10-dihydroxylation of phenanthrene.

B] Ozone. [O_3]

1. Preparation,

2. Reactions.

a) Synthesis of aldehydes and ketones,

b) Synthesis of dialdehydes and hydroxyl aldehydes,

c) In degradation of alcohols.

C] Selenium Dioxide.[SeO_2]

1. Preparations,

2. Reactions:

a) Oxidation of reactive methylene group into Carbonyl group.

b)In dehydrogenation reactions.

c) allylic hydroxylation and oxidation

D] Boron Trifluoride.[BF_3]

1. Prrparation ,

2. Reactions: In the formation of: a) acids, b) esters c) diketones,

d) Nitration, e) Sulphonation, f) Rearrangement reaction.

Part II (Inorganic Chemistry)

Unit:-V

[A] Chemistry of d-Block Elements   07

a) General Characteristics of d-Block Elements.

b) Electronic Configuration of Second & Third Transition Series Elements.

c) Comparison of Second & Third Transition Series Elements with first transition series elements.

d) Compounds of i) Rhodium & Irridium ii) Palladium & Platinum iii) Silver & Gold iv) Cadmium & Mercury.

[B] Chemistry of f-Block Elements.   **08**

1. Lanthanides:

a) Electronic Configuration.

b) Lanthanide Contraction, Consequences of Lanthanide Contraction and cause of lanthanide contraction.

c) Magnetic Properties of Lanthanides.

d) Variation in properties of lanthanides.

e) Comparison of Characteristics of d & f-block elements.

f) Extraction of Lanthanides by ion exchange method.

g) Applications of Lanthanides.

2. Actinides:

a) Electronic Configuration.

b) Properties of Actinides.

c) Comparison with Lanthanides.

d) Extraction of Uranium from Pitchblend.

e) Physical & Chemical Properties of Uranium.

f) Separation of Neptunium, Plutonium, Americium from Uranium.

g) Nuclear Fuels.

Reference books:

1. Organic chemistry by Morrison and Boyd, Print ice hall.

2. Organic chemistry by L.G. Wade. Print ice hall.

3. Organic chemistry Vol. I, II, III by S. M. Mukharji, S. P. Sing and R. P. Kapoor

4. Fundamental of organic chemistr y b y Solomon, John willey

5. A Text book of organic chemistry by Bahl and Bahl.

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8. Organic Chemistry, Reactions, Rearrangements and Reagents, by: O. P. Agarwal

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B. Sc. Second Year: Semester-IV

Paper-IX, (CCC IV, SectionB)

Physical & Inorganic Chemistry

Credits:02   **Periods: 45**

Part I (Physical Chemistry)

Unit:-I

Chemical Kinetics: **10**

1.1 Introduction: Rate of reaction, Definition and units of rate constant,

Factors affecting rate of reaction, Order and Molecularity of reaction.

1.2 Zero order reaction: Rate expression and Characteristics.

1.3 First order reaction: Rate expression and Characteristics.

1.4 Pseudounimolecular reactions.

1.5 Second order reaction: Derivation of rate constant for equal and unequal

concentrations of the reactants. Characteristics of second order reaction.

1.6 Methods of determination of order of a reaction.

1.7 Collision theory of reaction rates.

1.8 Effect of temperature on reaction rates and Arrhenius equation.

1.9 Numericals on first order reactions, half-life method.

Unit:-II   **06**

Electrochemistry:

2.1 Introduction, Conduction of electricity, Types of conductors: electronic and electrolytic.

2.2 Conductance of electrolytes: Conductance, Specificresistance, Specific conductance, Equivalent conductance, Molecular conductance and their units.

2.3 Variation of specific and equivalent conductance with dilution, Equivalent conductance at infinite dilution. Effect of temperature on conductance.

2.4 Conductivity cell, Cell constant and its determination.

2.5 Strong and weak electrolyte. Arrhenius theory of electrolytic dissociation and its limitations. Debye-Huckel theory of strong electrolytes. Relaxation effect and electrophoretic effect, Debye-Huckel Onsager's equation and its verification.

2.6 Migration of ions, Transport number.

2.7 Numericals on Specific conductance, Equivalent conductance and cell constant.

Unit:-III   **06**

3.1 Kohlrausch's law, Applications of Kohlrausch's law:

i) Determination of equivalent conductance at infinite dilution of weak electrolytes.

ii) Determination of degree of dissociation.

iii) Determination of solubility of sparingly soluble salts.

iv) Determination of absolute ionic mobility.

v) Determination of ionic product of water.

3.2 Conductometric titrations:

(i) Strong acid against strong base. (ii) Strong acid against weak base

(iii) Weak acid against strong base. (iv) Weak acid against weak base.

(v) Precipitation titration.

3.3 Advantages of conductometric titrations.

Unit:-IV

Photochemistry: **08**

3.1 Introduction to photochemistry, types of chemical reactions, difference between

thermal and photochemical reactions.

3.2 Lambert-Beer Law: Light absorption by solution, molar extinction coefficient,

transmittance, absorbance, optical density.

3.3 Laws of photochemistry: Grothus-Drapper law, Stark-Einstein law of

photochemical equivalence.

3.4 Quantum yield, experimental determination of quantum yield. High and low

quantum yield reactions. Reasons for high and low quantum yield.

3.5 Jablonski diagram with various Processes occurring in the excited state. (internal

Qualitative description of Fluorescence, phosphorescence, non-radiative processes

Conversion, inter- system crossing).Photosensitized reactions. Chemiluminescence.

3.6 Numericals on quantum yield.

Part II (Inorganic Chemistry)

Unit:-V

[A] Chemistry of Non-transition elements   **05**

a) Silicates: Definition, Basic Unit of silicate and classification on the basis of basic

unit and their characteristics.

b) Zeolite: Definition, preparation, classification and applications. Ultramarine.

c) Carbide: Definition, classification, preparation, properties and structure of ionic or

salt like carbides (CaC_2), Metallic carbide (TiC) and covalent carbides (SiC).

d) Fullerene: Preparation, properties, structure and applications.

[B] Chemistry of Halogen compounds   **10**

a) **Inter-halogen compounds:**

i)Definition, preparation and structure of XY, XY_3, XY_5, and XY_7 types of

inter-halogen compounds.

ii)Pseudo-halogen: Definition, preparation and properties.

b) **Fluorocarbon:** Definition, preparation properties and uses (Teflon).

c) **Polyhalides:** definition, preparation, properties & structure of ICl_2^-, & ICl_4^-

d) **Oxides of halogens:** Preparation, structure & uses of F_2O, Cl_2O, Cl_2O_7, & I_2O_5.

e) **Oxyacids of halogens:** Introduction, oxidation state, structure strength and stability. Basic properties of halogens: I^+ and I^{+3} compounds and their preparation.

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1. Physical Chemistry by G. M. Barrow (Tata Mc-Graw Hill publishing Co., Ltd.)

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B. Sc. Second Year: Semester- III &IV

CCCP II (CCC III & IV, Section A)

Practical based on P-VI & P-VIII

Laboratory Course- Paper-X

Credits:02   **Periods: 120**

Note: At least sixteen experiments should be taken.

Part I (Organic Chemistry)

1. Only demonstration

i) Determination of R_f values of O, M and P-nitro aniline.

ii) Separation of benzene and water by distillation method.

2. Qualitative analysis: Identification of following organic compounds.

(Two from each of the following)

a) Acids: Benzoic acid, Phthalic acid, Salicylic acid, Cinnamic acid, o-chloro benzoic acid.

b) Base: Aniline, P-nitroaniline, m-nitroaniline , resorcinol, P-toludiene.

c) Phenols: Phenol, α-naphthol, β-naphthol, p-cresol, m-nitrophenol.

d) Neutral: Naphthalene, Anthracene, Acetanilide, m-dinitrobenzene, Nitrobenzene.

3. **Quantitative analysis: (estimation) any four.**

a) Estimation of glycine by Sorenson's method.

b) Estimation of phenol by bromination method.

C) Estimation of glucose by iodination method.

d) Estimation of unsaturation (cinnamic acid).

e) Estimation of saponification value of an oil.

f) Estimation of iodine value of an oil.

g) Estimation of vitamin-C

h) Estimation of formaldehyde.

Part II (Inorganic Chemistry)

1 Determine volumetrically the amounts of sodium carbonate and sodium hydroxide present

together in the given solution provided 0.1 N HCl solution

2 Determine the percentage of $CaCO_3$ in the chalk sample, provided 1 N Hcl and 0.1N NaOH

3 Estimate the strength of the given sample of $KMnO_4$ Solution in g/lit. Prepare a standard solution of N/10 Mohr's salt or N/10 Sodium Oxalate solution

4 Estimate volumetrically the strength of Ferrous and ferric ion in the given solution provided N/10 $KMnO_4$ Solution

5 Determine the strength in g/lit of each of HCl and HNO_3 present together in the given solution. Provided N/10 NaOH and N/20 $AgNO_3$

6 Determination of Nickel using murexide as an indicator (Direct method)

7 Prepare standard solution of Zn ion standardize the give EDTA solution and estimate the amount of unknown Zn ion concentration

8 To determine the total, permanent and temporary hardness of water by complexometric method using EDTA.

B. Sc. Second Year: Semester- III &IV
CCCP III (CCC III & IV, Section B)
Practical based on P-VII & P-IX
Laboratory Course- Paper-XI

Credits:02   **Periods: 120**

Note: At least sixteen experiments should be taken.

Part I (Physical Chemistry)

Instrumental :

1. Determine the normality and strength of strong acid (HCl / H_2SO_4 / HNO_3) onductometrically using standard solution of strong base (NaOH / KOH).

2. Determine the normality and strength of weak acid (CH_3COOH / HCOOH) conductometrically using standard solution of strong base (NaOH / KOH).

3. To determine the solubility of a sparingly soluble salts ($BaSO_4$ / $PbSO_4$ / AgCl) conductometrically at room temperature.

4. Determine the normality and strength of strong acid (HCl / H_2SO_4 / HNO_3) potentiometrically using standard solution of strong base (NaOH / KOH).

5. Determine redox potential of Fe^{3+} / Fe^{2+} / or Sn^{4+}/Sn^{3+} or Ce^{4+} / Ce^{3+} system by titrating it with standard $K_2Cr_2O_7$ / $KMnO_4$ potentiometrically

6. Verification of Lamberts-Beer's law using $KMnO_4$ / $NiSO_4$ / $K_2Cr_2O_7$ / $CuSO_4$ colorimetrically and determine concentration of unknown solution.

7. Determine the concentration of Cu^{++} ion in given solution, titrating it against std. EDTA solution
by colorimetric measurement.

8. To determine the hydrolysis constant of anilinehydrocloride by pH measurement.

Non-Instrumental

1. To study the effect of addition of electrolyte (KCl / NaCl) on solubility of weak organic acid at room temperature.

2. Determine energy of activation of reaction between KI and $K_2S_2O_8$.

3. Determine the parachor of p-dichloro benzene by stalgmometer method.

4. To determine the composition of the given mixture consisting of two miscible liquids, A & B by

viscosity measurement.

5. Determine partition coefficient of iodine between carbon tetrachloride and water.

6. Determine the solubility of benzoic acid in water at different temperatures and hence its heat of

solution.

7. To study the effect of solute (NaCl / Succinic acid) on the CST of phenol- water system and hence

determine amount of solute in given sample of phenol – water composition.

8. To find out the enthalpy of neutralization of weak acid/weak base against strong base/strong acid

and determine the enthalpy of ionization of weak acid/ weak base.

9. To study the kinetics of dissolution of magnesium metal in dil.HCl

10. To study the kinetics of decomposition of sodium thiosulphate by a mineral acid

Part II (Inorganic Chemistry)

Separation of binary mixtures and estimation of any one by volumetric method:

1. Cu^{++} + Zn^{++}

2. Ba^{++} + Ca^{++}

3. Mn^{++} + Zn^{++}

4. Fe^{++} + Al^{+++}

Reference books:

1 Text book on practical Chemistry, by K. S. Mukherjee

2 Laboratory Manual of Organic chemistry Raj. K. Bansal.

3 Advanced practical organic chemistry, by: Vishnoi.

4 Experimental organic chemistry by: Sing.

5 Experimental Physical Chemistry by A. Findlay. Longman.

6 Advanced Practical Physical Chemistry by J.B. Yadav. (Goel Publishing house, Meerut).

7 Experiments in Physical Chemistry by R. C. Das and B. Behra. Tata Mc Graw Hill.

8 Advanced experimental Chemistry Vol. I. Physical by J. N. Gurtu and R. Kapoor. S. Chand & Co.

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12 Systematic Experimental Physical Chemistry – by S. W. Rajbhoj, Chondhekar. Anjali
Publication.

13 Practical Physical Chemisty – by B. D. Khosala & V. C. Garg. R. Chand & Sons.

14 Experiments in Chemistry by D. V. Jagirdar.

15 Practical Chemistry, Physical – Inorganic – Organic and Viva – voce by Balwant Rai Satija.
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16 College Practical Chemistry by H. N. Patel, S. R. Jakali, H. P. Subhedar, Miss. S. P. Turakhia.

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19 Practical chemistry (For B.Sc.I, II, III year) by O. P.Pandey, D.N. Bajpai, S. Giri, S. Chand & Co.

20 University practical chemistry by P. C. Kamboj , Vishal publishing co.

21 Advanced Practical Inorganic Chemistry by Gurdeep Raj. (Goel Publishing house, Meerut).

22 Advanced Practical Organic Chemistry by Dr O. P.Agarwal. (Goel Publishing house, Meerut).

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure
B. Sc. second year (Semester- III)
Semester Pattern effective from June -2017
Chemistry

Skill Enhancement Course SECC-I (A)

Food Processing And Food Adulteration: 02 Credits

Unit I Food Processing: 15 periods

1.1) Introduction, common food processing techniques : mincing, macerating, cooking, baking, boiling blanching, double steaming, frying, roasting.

1.2) Food processing an Indian prospective : Policy initiatives, Opportunities, Indian food processing industry, Research methodology, Analysis methods.

Unit II Food Preservation : 20 periods

1.3) Basic principles of food preservation- drying ,canning, pickling smoking packing.

1.4) Food preserving through Irradiation : Food irradiation, Radurization, Radicidation, Radappertization . Technologies : electron beam irradiation, Gamma radiation , x-ray radiation

1.5) Modern methods of food Preservation : Freeze drying, sodium benzoate , mechanism of food preservation, saccharin, saccharin and cancer.

1.6) Role preservatives in food processing : Phenylphenol, benzethonium chloride , calcium benzoate, sodium benzoate, calcium tartrate, dimethyl dicarbonate, ethylparaben, glycolic acid, hexamine.

Unit III Food adulteration: 10 periods

1.7) Detection of common food adulterants in : Spices, grains, oils, milk and milk products , food colors, tea , coffee.

Reference books

1) Food Preservation ---M.K.Singh (discovery publishing house Daryagang ,New delhi)
2) Food Science ----Shalini Pathak (Sonali Publications, Daryagang ,New delhi)
3) Food Processing --- M.K.Singh (discovery publishing house Daryagang ,New delhi)
4) Hand book of analysis and quality control for fruit and vegetable products : ----S.Ranganna II edition
5) Milk and milk products ---- S.Mahindra –APH Publishing house Daryagang ,New delhi
6) Food Microbiology -----W.C.Frazier/D.C.Westhoff –Tata mcgraw hill
7) Food Chemistry -----Shalini Saxena --Raga publication Daryagang ,New delhi
8) Rapid detection of food adulterants and contaminants ----Shyam Zha
9) Handbook of adulteration and safety --- Sumeet Malik

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure
B. Sc. second year (Semester- III)
Semester Pattern effective from June -2017
Chemistry

<div style="border:1px solid">Skill Enhancement Course SECC-II (B)</div>

PREPARATION OF SOLUTION AND ITS STANDARDIZATION

Unit I. **Introduction:** **10 periods**

1.1 Solute, solvent, solution, types of solutions, Homogeneous solution, Heterogeneous solution.
1.2 Concentration of solution, dilute solution, standard solution.

Unit II. **Ways of expressing the concentration of solutions and their preparation.**
10 periods

1.3 Percentage by mass (% w/W)
Percentage by volume (% v/V)
Mole fraction (x)
Molarity (M)
Molality (m)
Normality (N)
Parts per million (Ppm)
Parts per thousand (Ppt)

Unit III. **Preparation of standard solutions** **13 periods**

1.4 Preparation of any standard solutions from stock solution.
1.5 **Numerical**.
   (a) Molarity, Molality, Normality, Mole fraction, ppm, ppt.
   (b) Determination of concentration of mixing different concentrations and volume of same solution.
   (c) Determination of compostions of mixture in terms of mole fraction.

Unit IV. **Standardisation of solutions** **12 periods**

1.6 Standardisation of $KMnO_4$ solution.
Standardistion of HCl solution.
Standardisation of NaOH solution.
Standardisation of EDTA solution.
Standardisation of $K_2Cr_2O_7$ solution.

Reference books

1. Advanced practical of physical chemistry,
   Gurudeep Raj – Goel Publishing, House.

2. Advanced practical of inorganic chemistry
   Gurudeep Raj – Goel Publishing, House.

3. Systematic Experimantal physical chemistry.
   S.W. Rajbhoj, Dr. T.K. Chondhekar,
   Anjali Publication Aurangabad.

4. Essentials of physical chemistry,
   Arun Bahl, B.S. Bahl, G.D. Tuli(S.chand)

5. Practical chemistry by Dr. O.P. Pandey
   D.N. Bajpai, Dr. S. Giri (S.Chand)

6. Advanced practical physical chemistry,

   J.B. Yadav, Goel Publishing, House.

7. Advanced practical inorganic chemistry,

   O.P. Agrawal.

8. A Text book of practical chemistry for B.Sc,

   V.V. Nadkarny, A.N. Kothare and Y.V. Lawande.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED [M.S.]

Choice Based Credit System
(CBCS Pattern)
Faculty of Science and Technology
Syllabus of B.Sc. Second Year
Effective from Academic Year (2017-2018)
Under Graduate (UG) Program

Subject : **Computer Science**

Semester Pattern	Core Course Code Section	Paper No. & Title	Periods/ Week	Marks for		Total Credits (Marks)
				External: ESE TH+MCQ [30+10]	Internal: CA & SEC	
Semester-III	**CCCS-III Section-A**	**Theory Paper No.VI** Operating System	03	**Marks:** 40	**Marks:** 10	Credits: 02 (Marks:50)
	CCCS-III Section-B	**Theory Paper No.VII** Programming in C++	03	**Marks:** 40	**Marks:** 10	Credits: 02 (Marks:50)
	CCCSP-II Section-A	**Paper No. X** **Laboratory Course Work (LCW)-II:** Practical's based on theory papers-**VI & VII** **(OS and C++)**	04	**Marks:** 40	**Marks:** 10	Credits: 02 (Marks:50)
	SECCS-I	**Paper No. XI** **Skill Enhancement Course-I:** **A) Programming in SCILAB-I** **OR** **B) PC Installation & Networking**	03	**Marks: 25**	**Marks: 25**	Credits: 02 (Marks:50)
Semester-IV	**CCCS-IV Section-A**	**Theory Paper No. VIII** Computer Network	03	**Marks:** 40	**Marks:** 10	Credits: 02 (Marks:50)
	CCCS-IV Section-B	**Theory Paper No. IX** Programming in JAVA	03	**Marks:** 40	**Marks:** 10	Credits: 02 (Marks:50)
	CCCSP-III Section-B	**Paper No.XII** **Laboratory Course Work (LCW)-III:** Practical's based on theory papers-**VIII & IX** **(CN & Java)**	04	**Marks:** 40	**Marks:** 10	Credits: 02 (Marks:50)
	SECCS-II	**Paper No. XIII** **Skill Enhancement Course-II:** **A) Web Applications** **OR** **B) Digital Media**	03	**Marks: 25**	**Marks: 25**	Credits: 02 (Marks:50)
Total				**ESE Marks:290**	**SEC+CA Marks:50 +60=110**	**Credits:16 Marks:400**
(**CCC:** Core Course Computer, **CCCP:** Core Course Computer Practical, **LCW:** Laboratory Course Work, **ESE:** End of semester examination, **CA:** Continuous assessment, **SEC:** Skill Enhancement Course)						
Note: The size of the practical group/batch for practical papers is recommended to be 10-15 students as per the UGC Guidelines Under CBCS (Choice Based Credit System) -May 2015.						

Paper VI: Operating System

Unit I: Overview of Operating System
Introduction, What Operating Systems Do, Computer-System Organization, Computer-System Architecture, Special-Purpose Systems, Operating-System Structure, Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security, Distributed Systems, Special-Purpose Systems, Computing Environments

Unit II: Exploring Operating System
Operating-System Services, User Operating-System Interface, System Calls, Types of System Calls, System Programs, Operating-System Design and Implementation, Operating-System Structure, Virtual Machines, Operating-System Generation, System Boot

Unit III: Process & Threads
Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication, Examples of IPC Systems, Communication in Client- Server Systems, Overview of threads, Multithreading Models

Unit IV: Memory
Background, Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, virtual memory

Unit V: File System
File Concept, Access Methods, Directory Structure, File-System Mounting, File Sharing, Protection, File-System Structure

Unit VI: Protection in Operating System
Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Control, Revocation of Access Rights, Capability-Based Systems, Language-Based Protection

Text/Reference Books:
1. A SILBERSCHATZ, et.al. "Operating System Concepts", John Wiley & Sons.
2. A Tanenbaum ""Modern Operating Systems", PHI Publication
3. William Stallings "Operating Systems", Prentice Hall

Online References:
1. www.os-book,com

Paper No: VII : Object Oriented Programming using C++

Unit I: Object Oriented Programming & C++

Object Oriented Programming Paradigm, Basic Concepts of OOP, Benefits of OOP, Object Oriented Languages, Applications of OOP, A Simple C++ Program, More C++ Statements, Structure of C++ program.

Unit II: Basics of C++

Introduction, Tokens, Keywords, Identifiers & Constants, Basic Data Types, User-defined Data Types, Derived Data Types, Variables : declaration & dynamic initialization, Reference variables, Operators in C++ : Scope Resolution, Manipulators, Operator Precedence,

Decision Control & Loop Control Structures: If, If-else, Nested If, Else-if ladder, switch, go-to, break statement, while, do-while, for.

Unit III: Functions in C++

Introduction, Function Prototyping, Call by Value & Call by reference, inline function, default arguments, Function Overloading, Library Functions

Unit IV: Classes & Constructors in C++

Introduction, Structures, Specifying a Class, Defining member functions, Memory allocation for objects, Static Data Members, Static Member Functions, Objects as Function arguments, Friend Functions.

Introduction to Constructors, Parameterized Constructors, Copy Constructors, Multiple Constructors in a class, destructors.

Unit V: Operator Overloading

Introduction, Defining Operator overloading, Overloading Unary Operators, Overloading binary operators, overloading binary operator using friend, Rules for overloading operators

Unit VI: Inheritance in C++

Introduction, defining derived classes, single inheritance, multilevel inheritance, multiple inheritance, hierarchical inheritance, hybrid inheritance, virtual base classes, Abstract classes.

Text/Reference Books:-
1. Object-Oriented Programming with C++ -E-Balgurusamy
2. The C++ Complete Reference -TMH Publication
3. Object Oriented Programming in C++ by Robert Lafore
Online References:
1. www.spoken-tutorial.org free online course of C++

Paper VIII: Computer Network

Unit I : Introduction to Network
Definition & Applications of Computer Network, Data Transmission Modes, Protocol Hierarchies, Design issues for layers, Connection Oriented & Connectionless services. Service Primitives. Network Models – OSI/ISO Reference Model & TCP/IP Model,

Unit II : Network Hardware
Network Topologies, Network Devices - NIC Cards, Hub, Switch, Bridges, Wireless access points, Router, Gateways, Modems, ISDN Terminal Adaptor, Repeaters, Types of Networks

Unit III : Transmission Media
Magnetic Media, Twisted pair, Co-axial cable , fibre optics , radio transmission, Wireless transmission, Bluetooth.

Unit IV : Telephone System
Structure of telephone system, Transmission & Switching, Trunks & Multiplexing ,Type of Switching, Introduction to mobile telephone system.

Unit V : Internetworking protocols
Network Protocols, Email Architecture, Web server, Browsers, Domain Name System, IP protocol, IP addresses , IPv6. Introduction to Wi-Fi & 4G technology.

Unit VI : Network Security & Cryptography
Introduction to Security & Cryptography, Security concepts- Computer Security, Network Security, Information Security, Firewall, Working of Firewalls, Conventional Cryptography, Caesar's Cipher, public key Cryptography.

Text/Reference Books:
1. Computer Networks By Andrew S Tanenbaum (PHI) 4th edition
2. Computer Networking & Internet by Fred Halsall, Addison Wesley
3. Computer Networks – A Systems approach by Peterson MK Publishers
Online References:
1. www.nptel.ac.in: Free Online course on Computer Networks

Paper No: IX: Programming in Java

Unit I : Java Evolution.

Java History, Java Features, How java differs From C and C++, Java and Internet. Java & WWW, Web Browsers, Java support systems, Java Environment

Unit II : Overview of Java

Introduction, simple java program, More JAVA Statements, An application with two classes, Java program structure, implementation of a java program, JAVA Virtual Machine, Command Line Arguments

Java Tokens , Constants, Variables, Data Types, Declaration of variable, Giving Values to variables, Scope of Variables, Symbolic Constants, Type Casting, Getting Values of variables, Standard Default values, Java Statements

Unit III : Classes, Object and Methods

Introduction, Defining a class, Adding variables, Adding Methods, Creating Objects, Accessing Class Members, Constructors. Method Overloading, Static Members, Nesting of Method, Inheritance: Extending a class, Overriding Method, Final variable and Methods.

Unit IV : Interfaces - Multiple Inheritances

Introduction, Defining Interface, Extending Interface, Implementing Interface, Accessing Interface Variables

Unit V : Arrays and Strings

Introduction, One-dimensional Arrays, Creating an one dimensional array, Two dimensional Arrays, Creating an two dimensional array, String Arrays, String Method

Unit VI : Packages and Applets

Introduction, Java API package, Using system packages, Naming Conventions, Creating Packages, Accessing a package, Using a Package, Adding a class to a package.

Introduction, how applets differ from applications, preparing to write applets, building applet code, applet life cycle

Text/Reference Books :
1. Programming with Java - A primer-By E. Balagurusamy (Tata Me Graw Hill)
2. Java 2 Complete Reference
3. Java How to program by Deitel
Online References:
1. www.spoken-tutorial.com : Free Online course of JAVA

Paper No: X : Computer Lab-2

Laboratory Course Work (LCW)-II:

Practical's based on theory papers-**VII & IX (OS & C++)**

At least 20 (10 from each paper) practical exercises based on following guidelines:

1. Introduction to Linux

2. Linux Installation;

3. Simple Linux Commands:

alias, at, banner, cat, cd, chmod, chown, chroot, cp, dd, grep, gzip, gunzip, kill, ln, ls, mail, man, mcopy, mdel, mdir, more, ps, pwd, rm, rmdir, shutdown, sort, su, tar, unzip, vi, wc, who, whoami, zip.

4. Communication Commands:

write, wall, talk, mesg, motd.

5. Administration Commands:

adduser, cpio, fdformat, halt, hostname, ifconfig, login, logout, lpc, lpd, lprm, mount, mv, passwd, ping, quota, route, umount.

6. Shell Scripting;

7. Shell Programs.

C++ Practical List

1. Simple C++ Programs
2. Program in C++ using decision control structures
3. Program in C++ using looping statements
4. Program in C++ using Switch Statement
5. Program in C++ using functions
6. Program in C++ using a function with default arguments
7. Program in C++ using a class and member function defined outside the class
8. Program in C++ using Multiple Constructors in a class
9. Program in C++ using Object as function arguments
10. Program in C++ using Operator overloading
11. Program in C++ to Overload Unary Minus (-) Operator
12. Program in C++ to demonstrate Different types of Inheritance

13. Program in C++ to demonstrate Multiple Inheritance
14. Program in C++ to demonstrate Single Inheritance
15. Program in C++ using Static Data Members
16. Program in C++ to Demonstrate Use of File

Text/Reference Books:

1.Unix concepts and applications by Sumitabha Das McGraw Hill Education; 4 edition

2. UNIX: The Complete Reference, Second Edition McGraw Hill Education; 2 edition

3. The Unix Programming Environment by karnighan and Pike Pearson Education India; 1 edition

Paper No. XI - Skill Enhancement Course-I:

XI (A) Programming in SCILAB-I (Begineer)

Unit I
Why Scilab, Capabilities of Scilab package, benefits of shifting to scilab
Unit II
Installing
Show where to download from and how to decide which version to choose (OS and 32/64bit) (www.scilab.org/download)
Windows installation (Internet Connection is necessary)
 Linux installation (using package manager- show only Debian/Ubuntu as example (sudo apt-get install scilab) as well as generic binary
Unit III
Getting Started
Expressions: Show mathematical expressions with numbers, Variables, Diary command, Define symbolic constants, Basic functions, suppressing output(;), help, clc
Unit IV :
Vector Operations
Define vector, Calculate length of a vector, Perform mathematical operations on Vectors such as addition, subtraction and multiplication, Define a matrix, Calculate size of a matrix, Perform mathematical operations on Matrices such as addition, subtraction and multiplication
Unit V:
Matrix Operations
Access the elements of Matrix, Determine the determinant, inverse and eigen values of a matrix, Define special matrices, Perform elementary row operations, Solve the system of linear equations
Unit VI:

Conditional Branching

'if' and 'then' with the example, use of the 'else' keyword, use of the 'elseif' keyword, example for select

Text/References Books:
1. Engineering & Scientific Computing with MATLAB by C. Gomez
2. SCILAB by A.S. Nair

Online References:
1. www.spoken-tutorial.org

Paper No. XI - Skill Enhancement Course-I:
XI (B) PC Installation & Networking

<u>Course Objective :</u>

The course is designed to build practical skills in Assembling & maintenance of the personal desktop computer, installation of operating system and software's as well as to setup the network. The classes focus on workshops where students learn and apply these skills.

Unit I :

Study of computer devices : Keyboard, Mouse, Monitor, RAM, Hard Disk, CD Drive, Motherboard, SMPS, Pen Drive

Unit II :

Installation of Windows OS on a Computer

Unit III:

Windows OS Administration: Creating User, Installing/Uninstalling programs, copy files & folders, Creating a CD, Formatting Pen Drives,

Unit IV:

Installing printer, Connecting to LAN, Using Printer in LAN, Sharing Files on LAN

Unit V:

Connecting to Internet, Browsing web sites, creating an E-mail account, Downloading contents from Internet

Unit VI:

Using System Tools : diskcleanup, diskdefragmentation, Antivirus Software

Text/References Books:

1. Computer Installation & Servicing by D Balsubrmaniyam, McGraw Hill Pub.

2. PC : Repair & Maintenance a practical guide by J Rosenthal, K Irwin

3. Easy PC Maintainance & Repair by Philip Laplante, McGraw Hill Pub.

Online References:

1. www.nsdcindia.org official web site of National Skill Development Corporation

Paper No: XII : Computer Lab-3

Laboratory Course Work (LCW)-III:

(CN & Java)

1. Network Setup
2. Configuring IP Addresses
3. Simple JAVA Programs
4. JAVA Programs using control structures
5. Program in JAVA using Two classes
6. Program in JAVA to demonstrate Command Line Arguments
7. Program in JAVA to demonstrate Method Overloading
8. Program in JAVA using Inheritance
9. Program in JAVA to Demonstrate Method Overriding
10. Program in JAVA using Interface
11. Program in JAVA using an Array
12. Program in JAVA to demonstrate String Methods
13. Program in JAVA using user Package
14. Program in JAVA using system package
15 Program in JAVA using constructors

16.Program in JAVA using Nesting of Methods

Paper No : XIII
Skill Enhancement Course-II:
XIII(A) Web Site Designing using Google Sites

Course Objective :

The course is designed to build practical skills of development of web applications

Unit I

What is Web?, Internet, What is mean by web site?

Unit II

Create a site, Change your Sites Appearance, Change your Site's Layout, Create a Page, Create and Edit Page Templates

Unit III

Add text, images, or links, Create custom page layouts or gadgets, Add a Google Group on your website, Use scripts to do tasks on your site,

Unit IV

Attach files from your computer, Link to files or text within your site, Insert calendars, maps, Google Drive files and gadgets

Unit V

Share your site with other people, Change your site's homepage and search, Comment on a page

Unit VI

Track visitors to your site, Delete or move a page, Delete or restore your site, Keyboard shortcuts for Google Sites, Use Google Sites with a screen reader, Report abuse and illegal activity

Text/Reference Books:

1. Google sites & Chrome for Dummies by R Teeter & K Barksdale,
Online references:
1. www.sites.google.com

Paper No : XIII
Skill Enhancement Course-II:

XIII (B) Digital Media

Course Objective :

The course is designed to build practical skills in the creation and publication of digital technologies. The classes focus on workshops where students learn and apply these skills.

Unit I

Presentation Softwares : Introduction to power point , Creating Presentation with power point, Introduction to Flash , Creating Presentation with flash

Unit II

Blogging : Fundaments of blog, Common examples of Blog, Create a blog with multi-media content

Unit III

Digital photography : Basics of Digital Photography, Camera and shooting, Digital image editing , Digital image management

Unit IV

Podcast : Fundaments of Podcast, Audio recording and editing , Publishing and hosting podcast

Unit V

Promoting the Blogs : Social Media tools, Writing content for the web, Search engine optimisation

Unit VI

Copyrights : Towards Fair-use; Public domain; Digital commons, copyright in India- A overview

Text/References Books:

1. Digital Photography for dummies by Julie A King

2. Learning to use Powerpoint by A Bassant

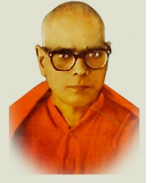3. Podcasting by Steve Shipside

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ
नांदेड— ४३१६०६ (महाराष्ट्र)

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY
NANDED-431606, MAHARASHTRA STATE, INDIA.
Established on 17th September 1994 - Recognized by the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'A' Grade

ACADEMIC (1-BOARD OF STUDIES) SECTION
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परिपत्रक

सर्व संबधितांना या परिपत्रकान्वये कळविण्यात येते की, प्रस्तूत विद्यापीठाच्या बहीर्जी स्मारक महाविद्यालय, बसमत येथे दिनांक ०४.०८.२०१७ रोजी विज्ञान व तंत्रज्ञान विद्याशाखेतील गणित विषयाच्या अभ्यासक्रमा बाबत कार्यशाळा/चर्चा सत्र आयोजित करण्यात आले. सदरील कार्यशाळेत B.Sc. Mathematics Second Year CBCS Pattern अभ्यासक्रमात (सोबत जोडल्या प्रमाणे) कांही दुरूस्ती करण्यात येवुन शैक्षणिक वर्ष २०१७—१८ पासुन लागु करण्याची विनंती करण्यात आली.

तरी उपरोक्त प्रमाणे B.Sc. Mathematics SY CBCS Pattern चा सोबत जोडलेला सुधारीत अभ्यासक्रम शैक्षणिक वर्ष २०१७—१८ पासुन लागु करण्याकरिता मा. कुलगुरूनी विद्या परीषदेच्या वतिने मान्यता प्रदान केली आहे.

तरी उपरोक्त प्रमाणे ही बाब सर्व संबंधितांच्या निदर्शनास आणून द्यावी.

''ज्ञानतीर्थ'' परिसर)(
विष्णुपूरी, नांदेड.)(स्वा/—
जा.क्र.शैक्षणिक ०१/प्रश्न पत्रीका/)(उपकुलसचिव
२०१७—१८/९४२)(शैक्षणिक (अभ्यासमंडळे) विभाग
दिनांक : २८/०८/२०१७

प्रत माहिती व पुढील कार्यवाहीस्तव :
१) प्राचार्य, सर्व संबंधित महाविद्यालये, प्रस्तुत विद्यापीठ.
२) संचालक, परीक्षा व मुल्यमापन मंडळ, प्रस्तुत विद्यापीठ.
३) कुलसचिव, (निवडणूक व सभा कक्ष) यांचे कार्यालय, प्रस्तुत विद्यापीठ.
४) उपकुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
६) सिस्टीम एक्सपर्ट, प्रस्तुत विद्यापीठ. (सदरील परिपत्रक व अभ्यासक्रम विद्यापीठाच्या संकेतस्थळावर प्रसारित करावे.)

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

CBCS PATTERN FOR B.1A./ B.Sc. MATHEMATICS

Credit Course Effective From 2016-17

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	2	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	External Marks	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	3 Theory-1, Practical-2	Six skills out of which one Skill can be chosen	25	25	50	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 For B. Sc. Students)	40	10	50	2
	SEC-II	3 Theory-1, Practical-2	Six skills out of which one Skill can be chosen	25	25	50	2
				Total Credits			16

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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 Exam	Internal C.A.	Total Marks	Credits
V	CCM-5 Section A	4	Paper-XII Metric Spaces	40	10	50	2
	CCM-5 Section B	4	Paper-XIII Linear Algebra	40	10	50	2
	CCM-5 Section C	4	Choose any one of the Following Electives papers XIV(A) Topology XIV(B)Number Theory XIV(C) Operation Research XIV(D)Introduction to Fuzzy logic	40	10	50	2
	SEC-III	3 Theory (1), Practical (2)	Six skills out of which one Skill can be chosen	25	25	50	2
VI	CCM -6 Section A	4	Paper-XV Numerical Analysis	40	10	50	2
	CCM -6 Section B	4	Paper-XVI Integral Transforms	40	10	50	2
	CCM -6 Section C	4	Choose any one of the Following Electives papers XVII(A) Complex Analysis XVII(B)Discrete Mathematics XVII(C)Mechanics XVII(D)Fundamentals of applied Statistics	40	10	50	2
	SEC-IV	3 Theory (1), Practical (2)	Six skills out of which one Skill can be chosen	25	25	50	2
			Total Credits				16

3

CBCS PATTERN FOR B.A./B.Sc. MATHEMATICS
Credit Course Effective From 2017-18
For B.A./B.Sc. II Year

Salient Feature

This course will assess student's prior knowledge of mathematics at UG Level and will refresh mathematical learning of these topics with these Key Stages. The emphasis will be getting students to reinforce mathematical knowledge and also develop a deeper conceptual understanding of the UG level mathematics which is basic as well as applied ,

Utility

- To Solve problems from Calculus like Differential equations, Ordinary as well as   Partial, Graphically to realize their. geometrical Interpretations.
- To handle higher order Matrices.
- Basic knowledge about the application of Mathematics in Physical Sciences and Biological sciences.
- Application of basic Mathematics to technical fields.

Learning Objectives

- To provide with the opportunity to acquire Mathematics to reach it to at least Key Stage UG Level
- To enable us to start the postgraduate basic training of mathematics as it is a requirement of the training of Basic applications of Mathematics
- To improve Students chances of employment.

Prerequisites:

1. Set Theory
2. Logic
3. Algebra & Trigonometry
4. 2D and 3D Geometry
5. Differential Calculus
6. Integral Calculus
7. MATLAB & similar Software Working knowledge

Note: ESE of SECM-1, SECM-2, should be evaluated at Annual Website displayed draft of B.Sc. S.Y.(C.B.C.S.) in the subject Mathematics syllabus after discussion on various suggestions is finalized and Approved.

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

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

Credit Course Effective From 2017-18

For B.A./B.Sc. II Year

Semester	Paper Code and Section	Periods per week	Paper No. and Title of the papers	External Exam	Internal C.A.	Credits
III	CCM-3 Section A	4	Paper –VI Real Analysis -I	40	10	2
	CCM-3 Section B	4	Paper – VII Group Theory	40	10	2
	CCM-3 Section C	4	Paper –VIII Ordinary Differential Equations (NOTE:- This Paper is Only For B.Sc. Students.)	40	10	2
	SEC-I	3 Theory (1), Practical (2)	Six skills out of which one Skill can be chosen amongst three optionals	25	25	2
IV	CCM-4 Section A	4	Paper-IX Real Analysis–II	40	10	2
	CCM-4 Section B	4	Paper –X Ring Theory	40	10	2
	CCM-4 Section C	4	Paper XI Partial Differential Equations (NOTE:- This Paper is Only For B.Sc. Students.)	40	10	2
	SEC-II	3 Theory (1), Practical (2)	Six skills out of which one Skill can be chosen amongst three optionals	25	25	2
Total Credits						16

Swami Ramanand Teerth Marathwada University Nanded
B.A./B.Sc. Second Year
New Syllabus (Mathematics)
Semester III and IV
Effective from June–2017
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B.A./B.Sc. Second Year Semester–III
Paper VI (MT 201) : Real Analysis–I
(CCM -3(Section A) For 2 Credits) (Effective from June–2017)
(No. of Periods : 60 ; Max.Marks : 50)

Unit–I : Sets and Functions
   Sets and Elements; Operations on sets, Functions, real valued functions, Equivalence,
   Real numbers, Least upper bounds.

Unit–II : Sequence of Real Numbers
   Definition of sequence and subsequence, Limit of a sequence,Convergent sequences,
   Divergent sequences, Bounded sequences, Monotone sequences, Cauchy sequences.

Unit–III : Series of Real Numbers
   Convergence and divergence, Series with non-negative terms,Alternative series,
   Conditional convergence and absolute convergence, General test for convergence,Tests
   for absolute convergence.

Recommended Text Book:-
 Methods of Real Analysis : By Richard R.Goldberg. Pub Oxford and IBH Publishing
Company

Scope :   **Unit-I : Chapter 1 :** 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7
              Unit-II : Chapter 2: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.10
              Unit-III : Chapter 3: 3.1, 3.2, 3.3, 3.4, 3.5,3.6

Reference Books:
1) Introduction to Real Analysis, By R.G. Bartle.(John Wiley and Sons)
2) Mathematical Analysis, By S.C.Malik, Savita Arora Pub New Age (Delhi)
3) Elements of Real Analysis, By Shanti Narayan and M.D. Raisinghania. (S. Chand and
Co).
4) Introduction to Real Analysis, By William F. Trench, Pearson Education Pub.
5) Mathematical Analysis, By Tom Apostol,N\arosa Pub. House, New Delhi.
6) Undergraduate Analysis, By Serage Lang Pub. Springer.
7) Real Analysis, By H.L. Royden Third Edition, Pub. PHI.
8) Principles of Real Analysis, By S. L. Gupta and N.R. Gupta ,Pub. Pearsons Education.
9) Real Analysis, By Dr Harikishan and Dr. Megha Rani , Pub. Pragati Prakshan .
10) An Introduction to Sequences, Series and improper Integrals, By O. E. Stanaitis ,
Pub. Holden-Dey , Inc. San Francisco, California.
11) Infinite series, By Earl D. Rainville, Pub, The Macmillan Co., New York.
12) A Course of Mathematical Analysis, By Shanti Narayan , Pub. S. Chand & Co.,
New Delhi.
13) A First course in Mathematical Analysis, By D. Somasundaram and B.Choudhary:,
Pub Narosa Publ. House.
14) Real Analysis, By Carothers, Pub. Cambridge University Press .
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Unit–I :
  Mapping, examples of mappings, the integers, group theory, definition of a group, some examples of groups, some preliminary lemmas.

Unit–II :
  Subgroups, cyclic groups, cyclic subgroups, A counting principle (Statement only of Lemma 2.5.1, Corollary and Theorem 2.5.1), Normal Subgroups and Quotient groups, Properties and examples.

Unit–III :
  Homomorphism's, Definitions, Examples and Properties, Cauchy's Theorem for Abelian groups, Sylow's, Theorem for Abelian groups (Statement Only), Automorphisms, definitions, Cayley's theorem, permutation groups.

Recommended Text Book : Topic in Algebra, by I.N. Herstein, John Wiley and Sons (New York) (Second Edition)

Scope : –   **Unit–I :** 1.2, 1.3, 2.1, 2.2, and 2.3
          Unit–II : 2.4, 2.5, 2.6
          Unit–III : 2.7 (Delete applications, Cauchy's theorem on wards), 2.8
              2.9, 2.10.

Reference Books :
1) A first course in abstract algebra, By J.B. Fraleigh, Narosa Publications.
2) Contemporary Abstract Algebra, By Joseph Gallion, Narosa Publications.
3) Modern Algebra, By A.R. Vasistha, Krishna Prakashan Media.
4) Modern Algebra, By R.P. Rohtatgi, Dominant Publishers and Distributors, New Delhi.
5) Modern Algebra, By Goyal and Gupta, Pragati Prakashan Meerut
6) College Mathematics, By N.R. Jayaram and R.V. Prabhakara, Himalaya Publishing House.
7) Elements of Logic and Modern Algebra, By M.V. Bhat and M.L. Bhave, S. Chand and Company Ltd. Ramnagar, New Delhi 110055
8) Abstract Algebra, By Vijay K. Khanna, Vikas Publication Company
9) Basic Algebra,Vol. I and II, By N.Jocobson : W.H.Freeman,1980(Hindustan Publishing Co.
10) A Text Book Of Modern Abstract Algebra, By Shanti Narayan :, S. Chand and Co., New Delhi
11) Matrix and Linear Algebra, By K.B.Datta: Prentice Hall of India Pvt.Ltd.New Delhi,2000
12) Basic Abstract Algebra, By P.B.Bhattacharya, S.K.Jain and S.R.Nagpal :   (II Edition) Cambridge University Press Indian Edition,1997.
13) Algebra, By Vivek Sahai and Vikas Bisht :, Narosa Publishing House ,1997.
14) Fundamentals of Abstract Algebra, By D.s.Malik,J.N.Mordeson and M.K.Sen, McGraw
Hill International Edition 1997
15) Lectures on Abstract Algebra, By T.M.Karade, J.N.Salunke, K.S.Adhav, M.S.Bendre, Sonu Nilu Publication.Nagpur (II Publication)
16) Algebra, By M Artin , Pub, PHI New Delhi 1994.

17) University Algebra, By N. S. Gopalakrishnan, New Age. Delhi.

B.Sc. Second Year Semester–III
Paper VIII (MT 203): Ordinary Differential Equations
(CCM-3(Section C) For 2 Credits) (Effective from June–2017)
(No. of Periods: 60; Max. Marks : 50)
NOTE:-This Paper is only For B.Sc. Students.

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Unit–I : Preliminaries:
Polynomials, Determinants, Linear Equations of the First Order Differential Equation, Linear Equation of the First Order, The Equation $y' + ay = 0$, the equation $y' + ay = b(x)$, The general linear equations of the first order.

Unit–II: Linear Equations with Constant Coefficients.
The second order homogeneous equations, IVPs for second order homogeneous equations, Linear dependence and independence, A formula for the Wronskian, The non-homogeneous, The non-homogeneous equations of order two.

Unit–III: Linear Equations with Variable Coefficients.
IVPs for homogeneous equation, Solution of the homogeneous equation, The Wronskain and linear independence.

Text Book: Introduction to Ordinary Differential Equations, By. E. A. Coddington, Prentice Hall of India.

Scope: **Unit–1 :** Chapter 0 : Articles 4, 6; Chapter 1 : Complete
               Unit–2 : Chapter 2 : Articles 1 to 6.
               Unit–3 : Chapter 3 : Articles 1 to 4.

Reference Books:
1) Differential Equations with Applications and Historical Notes, By G. F. Simmons Second Edition, Mc Graw Hill.
2) Ordinary Differential Equations, By Purna Chandra Biswal pub.PHI Learning private Ltd., New Delhi
3) Ordinary Differential Equations, By G. Birkhoff and G. C. Rota, John Wiley and Sons.
4) Introductory Course on Differential Equations, By D.A. Murray, Orient Longman India
5) Differential Equations, By Raisinghania, S. Chand. Co.
6) Differential Equations, By J N Sharma, Krishna Prakashan , Meerut
7) Theory and Problems of Differential Equations, By Frank Ayres, Mc Graw Hill
8) Lectures on Differential Equations, By T.M. Karade, Sonu-Nilu Pub. Nagpur.

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Unit–I : The Riemann Integral.

Definitions and Existence of the integral, Refinement of partitions; Darboux's theorem, Conditions of integrability, Intergrability of the sum and difference of Integrable functions, The integral as a limit of sums (Riemann Sums).Some Integrable Functions ,

Unit–II

Integration and Differentiations, Fundamental Theorem of Calculus, Mean value Theorem.

Improper Integrals

Introduction, Integration of unbounded functions with Finite Limits of Integration,

Comparison Tests for Convergence at a of $\int\limits_{a}^{b} f dx$, Absolute Convergence.

Unit III Fourier Series

Trigonometric Series, Fourier Series , Some Preliminary Theorems, Periodic Function, Some Definitions, Some Theorems, The Main Theorem ,Fourier Series of Even and Odd Functions , Half Range Series

Text Book : Mathematical Analysis, By S. C. Malik, Savita Arora, New Age. (Delhi)

Scope :

Unit I   Chapter 9 Articles 1, 1.1, 1.2, 2, 3 ,4 ,5, 5.1, 6, 6.2, 7.
Unit II   Chapter 9 Articles 8, 9, 10.
               Chapter 11 Articles 1, 2, 3 3.1, 3.2 3.3 3.4, 3.5.
Unit III   Chapter 14 Articles 1. 1.1, 2, 2.1, 2.2, 2.3, 3, 3.1, 3.2.

Reference Books:
1) Introduction to Real Analysis, By R.G. Bartle. (John Wiley and Sons)
2) Differential calculus, By Shanti Narayan.(S. Chand and Co.)
3) Elements of Real Analysis, By Shanti Narayan and M.D. Raisinghania. (S. Chand and Co).
4) Introduction to Real Analysis, By William F. Trench, Pearson Education Pub.
5) Mathematical Analysis, By Tom Apostol,N\arosa Pub. House, New Delhi.
6) Undergraduate Analysis, By Serage Lang Pub. Springer.
7) Real Analysis, By H.L. Royden Third Edition, Pub. PHI.
8) Principles of Real Analysis, By S. L. Gupta and N.R. Gupta, Pub. Pearsons Education.
9) Real Analysis, By Dr Harikishan and Dr. Megha Rani , Pub. Pragati Prakshan .
10) An Introduction to Sequences, Series and improper Integrals, By O. E. Stanaitis , Pub. Holden-Dey, Inc. San Francisco, California.
11) Infinite series, By Earl D. Rainville, Pub, The Macmillan Co., New York.
12) A Course of Mathematical Analysis, By Shanti Narayan, Pub. S. Chand & Co., New Delhi.
13) First course in Mathematical Analysis, By D. Somasundaram and B. Choudhary, Pub Narosa Publ. House.
14) Real Analysis, By Carothers, Pub. Cambridge University Press.
15) Methods of Real Analysis, By Richard R.Goldberg, Pub Oxford and IBH Publishing Company.

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Unit–I :

Ring, Definition and examples of rings, some special classes of Rings, Homomorphisms, Isomorphism

Unit–II :

Ideals and Quotient Rings, More Ideals and Quotients rings, The field of quotients of an integral domains. Euclidean Rings

Unit–III :

A particular Euclidean Ring, Polynomial Rings, Polynomial over the Rational field, Polynomial Rings over commutative Rings

Text Book : Topics in Algebra, By I.N. Herstein, John Wiley and Sons (New York) (Second Edition)

Scope : –   **Unit–I** : 3.1, 3.2, 3.3
          Unit–II : 3.4, 3.5, 3.6, 3.7
          Unit–III : 3.8, 3.9, 3.10, 3.11 (Lemma 3.11.1 and its corollary only)

Reference Books :

1) Modern Algebra, By A.R. Vasishtha, Krishna, Prakashan Media.
2) A first course in abstract Algebra, By J.B. Fraleigh, Narosa Publication.
3) Contemporary Abstract Algebra, By Joseph Gallion, Narosa Publications.
4) Modern Algebra, By R.P. Rohtagi, Dominant Publishers and Distributors, New Delhi.
5) Modern Algebra, By Goyal and Gupta, Pragati Prakashan Meerut.
6) Basic Algebra, Vol. I and II, By N.Jocobson, W.H.Freeman,1980 (Hindustan Publishing Co.
7) A Text Book of Modern Abstract Algebra, By Shanti Narayan, S. Chand and Co., New Delhi
8) Matrix and Linear Algebra,,By K.B.Datta: Prentice Hall of India Pvt.Ltd.New Delhi,2000
9) Lectures on Abstract Algebra, By T.M.Karade, J.N.Salunke, K.S.Adhav, M.S.Bendre, Sonu Nilu Publication.Nagpur(IInd Publication)
10) Algebra, By M Artin , Pub, PHI New Delhi 1994.
11) University Algebra, By N. S. Gopalakrishnan, New Age. Delhi.
12) Rings and Modules, By C. Musili , Narosa Publishing House , 1992.

B.Sc. Second Year Semester–IV
Paper XI (MT 206): Partial Differential Equations
(CCM-4(Section C) For 2 Credits) (Effective from June–2017)
(No. of Periods: 60; Max. Marks : 50)
NOTE:-This Paper is Only For B. Sc. Students

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Unit–I :

Partial differential equations, order, method of forming partial differential equations, solution of equations by direct integration, Lagrange's linear equation, working rule, method
of multipliers.

Unit–II :

Partial differential equations nonlinear in p and q, Charpit's method, linear homogeneous partial differential equations of nth order with constant coefficients, rules for finding the complementary function, rules for finding the particular integral, nonlinear homogeneous,
linear equations, Monge's method.

Unit–III :

Introduction, method of separation of variables, equation of vibrating string, solution of wave equation by D' Alembert's method, one dimensional heat flow, two dimensional heat flow,
Laplace equation in polar coordinates, transmission line equations.

Text Book : Advanced Engineering Mathematics, by H.K.Dass, S.Chand & Company Ltd.

Scope :-   **Unit 1 ;** Article 9.1 to 9.7
            Unit II: Articles 9.8 to 9.14
            Unit III: Articles 9.15 to 9.22.

Reference Books :

1) Differential Equations with Applications and Historical Notes, By G. F. Simmons, Second Edition, McGraw Hill.
2) Partial Differential Equations, By W. E. Williams, Claredon Press Oxford.
3) Partial Differential Equations, By E. T. Copson, Cambridge University Press.
4) Introductory Course on Differential Equations, By D.A. Murray, Orient Longman
5) Differential Equations, By Raisinghania , S. Chand. Co.
6) Differential Equations, By J N Sharma, Krishna Prakashan , Meerut
7) Theory and Problems of Differential Equations, By Frank Ayres, Mc Graw Hill
8) Lectures on Differential Equations, By T.M. Karade, Sonu-Nilu Pub. Nagpur.
9) Elements of Partial Differential Equations, By I.N. Sneddon, Mc Graw Hill. Co.
10) Partial Differential Equations, By A.R. Vasishtha & V. VasishthaPub. Krishana Prakashan , Meerut.
11) Partial Differential Equations, By Phoolan Prasad & Renuka Ravindran, New Age Inter. Pub.

B.A./B.Sc. Second Year Semester–III & IV
ANNUAL PATTERN EVALUATION SKILLS
(SECM-1 For 2 Credits)
(Effective from June–2017)
Continuous Assessment (CA) : 25
(Records in the form of Dissertations 10 + Seminar 10+5 Performance test)
End Semester Exam (ESE)
(No. of Periods: 2 Periods Practical, 1 Theory per week; Max. Marks : 25 +25 =50)

Note:-Amongst the following skills student can choose one for third semester

SKILLS FOR B.Sc. (Mathematics) II YEAR, SEMESTER III

SKILL – I

- Plotting of Graphs using mathematical software like Scilab, MATLAB, Mathematica, Maple etc.

SKILL – II

- Solving of Ordinary differential equations using mathematical software like Scilab, MATLAB, Mathematica, Maple etc

REFERENCES

1. Getting Started With MATLAB 7 - Rudra Pratap, Oxford University Press, (Indian Eden) www.oup.com
2. Introduction to Scilab – Michaël Baudin, Consortium Scilab, 2010.
3. Atlas - automatically tuned linear algebra software. http://math-atlas.sourceforge.net.
4. Cecill and free software. http://www.cecill.info.
5. The Scilab Consortium. Scilab. http://www.scilab.org.
6. Intel. Intel math kernel library. http://software.intel.com/en-us/intel-mkl/.
7. Sylvestre Ledru. Different execution modes of Scilab. http://wiki.scilab.org/Different_execution_modes_of_Scilab.
8. Flexdock project. Flexdock project home. https://flexdock.dev.java.net/.

B.A./B.Sc. Second Year Semester–IV
ANNUAL PATTERN EVALUATION SKILLS
(SECM-2, For 2 Credits)
(Effective from June–2017)

Continuous Assessment (CA) : 25
(Records in the form of Dissertations 10 + Seminar 10+5 Performance test)
End Semester Exam (ESE): 25
(No. of Periods: 2 Periods Pratical, 1 Theory per week; Max. Marks : 25)
Note:-Amongst the following skills student can choose one for Fourth semester

<u>SKILLS FOR B.Sc. (Mathematics) II YEAR, SEMESTER IV</u>

<u>SKILL – III</u>

- Solving problems in Calculus using mathematical software like Scilab, MATLAB, Mathematica, Maple etc

<u>SKILL – IV</u>

- Introduction to symbolic methods and solving problems using mathematical software like Scilab, MATLAB, Mathematica, Maple etc

<u>REFERENCES</u>

1. Getting Started With MATLAB 7 - Rudra Pratap, Oxford University Press, (Indian Eden) www.oup.com
2. Introduction to Scilab – Michaël Baudin, Consortium Scilab, 2010.
3. Atlas - automatically tuned linear algebra software. http://math-atlas.sourceforge.net.
4. Cecill and free software. http://www.cecill.info.
5. The Scilab Consortium. Scilab. http://www.scilab.org.
6. Intel. Intel math kernel library. http://software.intel.com/en-us/intel-mkl/.
7. Sylvestre Ledru. Different execution modes of Scilab. http://wiki.scilab.org/Different_execution_modes_of_Scilab.
8. Flexdock project. Flexdock project home. https://flexdock.dev.java.net/.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER PATTERN
Post Graduate (PG) Programs under Faculty of Science
(Affiliated Colleges)
(w.e.f. Academic Year 2014-15)

SYLLABUS FOR M.Sc. PART-II EXAMINATION

M.Sc. PHYSICS
(SEMESTER PATTERN)

JUNE -2015

M.Sc. Part-I and Part-II Examination in Physics
(Semester Pattern)

There shall be total four semesters (Two for M.Sc. Part-I and Two for M.Sc. Part-II). There shall be four theory papers (100 marks each) semester Pattern and Four practical papers (100 marks each) Annual pattern. It is expected that the students should visit Research Laboratories and industrial establishments of repute.

M. Sc. Part – II Third Semester
Paper No. Title of the Theory Papers Marks

Paper No.	Title of the Theory Papers	credit
PH-15	Electrodynamics	4
PH-16	Nuclear and Particle Physics	4
PH-17	Basics of Laser and Devices	4
*PH-18	Elective Papers: PH18 (A or B or C)	4
PH-19 Seminar	(25 marks)	Credets:1
Title of the Practical Papers		
PH-20	(Practical Course)	4
PH-21	(Practical Course)	4

M. Sc. Part –II Fourth Semester
Paper No. Title of the Theory Papers Marks

Paper No.	Title of the Theory Papers	credit
PH-22	Fiber Optics and Optical Fiber Communication	4
PH-23	Microwaves and Measurements	4
PH-24	Microprocessors and Microcontrollers	4
*PH-25	Elective Papers :PH25 (A or B or C)	4
PH-26 Seminar	(25 marks)	Credets:1
Title of the Practical Papers		
PH-27	(Practical course)	4
PH-28	Project work and Seminar on project	4

CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER PATTERN
Post Graduate (PG) Programs under Faculty of Science
(Affiliated Colleges)
(w.e.f. Academic Year 2014-15)

Name of the Faculty	Total credits	Average credits per semester
Science	100	25

Note:
>Assessment shall consist of Continuous assessment **(CA)** and End of Semester Examination **(ESE).**
> **Weightage:** 75% for ESE & 25% for CA
> **Paper- (Elective):** Transfer of Credit as per Student cho

Tentative Distribution of Credits for PG under Science faculty:

Semester	Paper No	External (ESE)	Internal (CA)	Total
Sem. III	Paper-I (PH:15)	(75 marks) (25 marks)	(2Test : 15 marks+ Assignments :10 marks)	Credit: 4 (100 marks)
	Paper-II (PH:16)	(75 marks) (25 marks)	(2Test : 15 marks+ Assignments :10 marks)	Credit: 4 (100 marks)
	Paper-III(PH:17)	(75 marks) (25 marks)	(2Test : 15 marks+ Assignments :10 marks)	Credit: 4 (100 marks)
	*Paper-IV(PH:18 A, B, C or other choice of student) (Elective)	(75 marks) (25 marks)	(2Test : 15 marks+ Assignments :10 marks)	Credit: 4 (100 marks)
	Paper –V (PH:19) (Seminar)	(25 marks)	Credit: 1(25 marks)	Credit: 1
	Sem: III Credit: 17		**Total for**	**Credit: 17**
Sem. IV	Paper-I (PH:22)	(75 marks) (25 marks)	(2Test : 15 marks+ Assignments :10 marks)	Credit: 4 (100 marks)
	Paper-II(PH:23)	(75 marks) (25 marks)	(2Test : 15 marks+ Assignments :10 marks)	Credit: 4 (100 marks)
	Paper-III (PH:24)	(75 marks) (25 marks)	(2Test : 15 marks+ Assignments :10 marks)	Credit: 4 (100 marks)
	*Paper-IV (PH:25A, B, C or other choice of student) (Elective)	(75 marks) (25 marks)	(2Test : 15 marks+ Assignments :10 marks)	Credit: 4 (100 marks)
	Paper –V (PH:26) (Seminar)	(25 marks)	Credit: 1(25 marks)	Credit: 1
	Sem: IV Credit: 17		**Total for**	**Credit: 17**
Lab Course Work (Annual Practical)	Practical Course Work –I(PH:20	(75 marks)	(25 marks)	Credit: 4 (100 marks)
	Practical Course Work –II (PH:21)	(75 marks)	(25 marks)	Credit: 4 (100 marks)
	Practical Course Work-III (PH: 27)	(75 marks)	(25 marks)	Credit: 4 (100 marks)
	Project work PH:28	(75 marks)	(25 marks)	Credit: 4 (100 marks)
	Total for Lab Course work(Annual)			**Credit: 16**
	Total for M.Sc. II Year: Sem. III+ Sem. IV + Lab Course work (Annual) Credit: 50			**Credit: 50**

Paper Setting Pattern for   M. Sc.II (Sem III and IV)

All questions are compulsory and carry equal Marks

Q.1 a)   ----------- 8
   b)   ------------7
                OR   Unit I
   x)   ------------8
   y)   ---------7
Q.2 a)   ----------- 8
   b)   ------------7
                OR   Unit II
   x)   ------------8
   y)   ---------7
Q.3 a)   ----------- 8
   b)   ------------7   Unit III
                OR
   x)   ------------8
   y)   ---------7
Q.4 a)   ----------- 8
   b)   ------------7
                OR   Unit IV
   x)   ------------8
   y)   ---------7
Q.5 a)   ----------- 8
   b)   ------------7
                OR   Unit V
   x)   ------------8
   y)   ---------7

SEMISTER: III
Electrodynamics

Paper: PH-15   **Lectures: 45**   **Credits: 4**

Unit I. Maxwell's equations and Electromagnetic waves: (09 lectures)
Maxwell's equations and their physical significance. Equation of continuity and relaxation time, Vector and scalar potentials, Lorentz and Coulomb gauge, electromagnetic energy and Poynting's theorem, electromagnetic wave equations in free space, their plane wave solutions, waves in conducting medium: skin depth, waves in ionized medium (ionospheric opagation) polarization of EM waves. Concept of radiation pressure

Unit II. Electromagnetic waves in bounded media: (09 lectures)
Reflection and refraction of plane electromagnetic waves at a plane interface: normal incidence, oblique incidence, Fressnel's equations, and Brewster's angle. Total internal reflection. Reflection and refraction from metallic surfaces, Electromagnetic wave propagation between two parallel conducting plates, waves in hollow conductors, Rectangular wave guides – TE and TM modes.

Unit III Radiations from moving charges: (08 lectures)
Concept of retarded potential, The Lienard-Wiechert potentials, Fields produced by moving charges, radiations from an accelerated charged particle at low velocities, radiations from a charged particles with co-linear velocity and acceleration, Radiations from an accelerated charged particle at low velocities in circular orbits-Larmor formula, Radiations from an accelerated charged particle at relativistic velocities in circular orbitsrelativistic generalization of Larmor Formula.

Unit IV Radiating Systems: (09 lectures)
Multipole expansion of EM fields, Electric dipole radiations, field due to oscillating electric dipole, magnetic dipole radiations, electric quadrupole radiation, fields due to linear, centre-fed antenna, simple array of antennas.

Unit V Relativistic Electrodynamics: (10 lectures)
Galilean transformations, Lorentz transformations and basic kinematical results of special relativity (length contraction, time dilation, addition of velocities, charge invariance, field transformation, etc), relativistic momentum and energy of a particle, mathematical properties of space-time in special relativity

Text Books:
1. Classical Electrodynamics - J.D. Jackson (John Wiley and Sons)
2. Classical Electromagnetic Radiation - J.B. Marion (Academic Pres)
Books Recommended for reference:
3**.** The Classical theory of Fields - Landau and Lifshitz (*Pergman Press*)
4. Electrodynamics of continuous media - Landau and Lifshitz (*Butter Worth*)
5. Electricity and Magnetism - David J. Griffiths (*PHI*)
6. Electricity and Magnetism - Panofsky and Philips
7. Electromagnetic waves and fields - R.N. Singh (*Tata McGraw Hill*)
8. Electromagnetic Waves and Radiation system - Jordan and Balman (*PHI*)
9. Electromagnetic Fields and waves - Paul Lorrain and Dale Corson (*CBSPub*)

10. Electromagnetics - B.B Laud (*New Age Intl. Pub.*)

Nuclear and Particle Physics

Paper: PH-16 **Lectures: 45** **Credits: 4**

Unit I Basic Nuclear properties (09)
Nuclear size & its determination, nuclear radii by Rutherford scattering, electron scattering & mirror nuclei method, nuclear quantum numbers, angular Momentum, nuclear dipole moment, electric quadruple moment.

Unit II Interaction of nuclear radiation with matter (09)
Interaction of charged particles & em rays with matter, range, straggling, stopping power, ionization chamber, proportional counter, GM counter, scintillation detector, semiconductor detector.

Unit III Nuclear forces and Nuclear Models (09)
Elements of two body problem, charge independence & charge symmetry of nuclear forces, Meson theory of nuclear forces.

Nuclear Models:
B.E., Semi empirical mass formula & applications, nuclear shell model, liquid drop model collective model, collective model, Fermi gas model.

Unit IV Nuclear decay & Reactions (09)
Radioactive decay, laws of successive transformation, dosemetry nuclear reactions, fission & fusion. β – decay, three forms of β - decay, Fermi theory of β - decay, kurie plot, selection ule, non conservation of parity in β - decay.

Unit V Elementary particles (09)
Weak, strong & electromagnetic interaction, classification of elementary particles, conservation laws, quark theory.

Reference Books:
1) Nuclear Physics by -Irving Kaplan
2) Nuclear Physics by -Patel S.B. Wiley Eastern Publishing House

Basics of Laser and Devices

Paper: PH-17   **Lectures: 45**   **Credits: 4**

Unit I   **(09)**
Properties of Lasers,Intensity,Monochromaticity,Directionality and coherence, Einstein's coefficients, Momentum transfer, Life time and possibility of amplification.

Unit II   **(09)**
Concepts of waves and interference, Temporal and spatial coherence, Coherence of the field and size of the source, Coherence and monochromaticity, Shape and width of spectral lines, Line broadening mechanism, Intrinsic broadening, collision broadening, Doppler broadening.

Unit III   **(09)**
Basic principles of lasers, population inversion, Laser pumping, Two level and three level pumping, Vibrational modes and mode density of resonator, Open and confocal resonator.

Unit IV   **(09)**
Ruby laser, Three level system and its pumping power, Nd:YAG and Nd:Glass laser ,its energy level diagram and salient features.
He-Ne lasers: Energy level diagram, construction and salient features of the He-Ne laser device,
He-Cd and He-Sc laser: Energy level description and salient features, Molecular gas laser-CO_2 gas laser, Energy level scheme and general features.

Unit V   **(09)**
Nonlinear optics, Harmonic generation, Phase matching, Optical mixing parametric generation of light and self focusing.
Applications of Lasers: Applications of lasers in (i) Communication (ii) Industry (iii) Medicine (iv) Biology (v) Astronomy.

Recommended Books:
1.Lasers and Non linear Optics: B.B. Laud,New Age International Ltd,Delhi.
2.Introduction to Laser Physics: Koichi Shimoda (Springer Verlag)
3.Optics an Lasers : M.Young (Springer Verlag)
4. Laser Fundamentals : William T. Silfvast Cambridge University, Press

Thin Film and Nano Physics

Paper: PH-18A   **Lectures: 45**   **Credits: 4**

Unit 1: Thin film deposition methods   (10)

Introduction to Thin Films, Physical Methods - Thermal evaporation methods: Resistive heating, Flash evaporation, Laser evaporation, Electron bombardment heating, Arc evaporation, Sputtering process: Glow discharge, DC sputtering, Radio frequency sputtering, Magnetron sputtering, Ion beam sputtering.

Unit 2: Chemical Methods   (10)

Chemical vapor deposition: Common CVD reactions, Methods of film preparation, laser CVD, Photochemical CVD, Plasma enhanced CVD, Chemical bath deposition: ionic and solubility products, preparation of binary semiconductors, **Electrode position:** Deposition mechanism and preparation of compound thin film **Spray pyrolysis**: Deposition mechanism and preparation of compound thin Films

Unit 3: Nucleation, growth and structure of films   (8)

Nucleation: Condensation process, Langmuir- Frenkel theory, other theories of condensation and experimental results, **Growth**: Liquid like coalescence, influence of deposition parameters, physical structure of films, Crystallographic structure of films: lattice constant, Size effect, Disordered and amorphous structures, Epitaxial growth of thin films: Influence of substrate and deposition conditions, theories of Epitaxy.

Unit 4: Properties of thin films   (08)

Mechanical properties: Stresses in thin films, Mechanical constants of thin films, **Electrical properties:** Electrical conduction in thin metallic discontinuous films, Electrical conduction in thin metallic films, **Optical properties:** Optical constants of thin films, experimental methods as Reflection, Interferometric, and Critical angle method.

Unit 5: Nanoscience and nanotechnology   (09)

Introduction, Nanoscience and nanotechnology, Quantum structures, Nanoclusters, organic nanocrystals. **Synthesis of Nanomaterials:** metal colloids, Nanoclusters, nanotubes, nanowires, nano rods, nanocrystalline materials, oxide nanoparticles. **Application of Nanotechnology**: Nanobiology, nanocatalysis, nanoelectrodes, nanoswitches, nanocomputers.

Reference books
1. Thin Film Phenomena by K L Chopra McGraw -Hill Book Company, NY 1969
2. Thin Film Technology by O S Heavens (1970)
3. Properties of Thin Films by Joy George, Marcel and Decker, (1992) (For Units 1-3)
4. Physics of Thin Films L Eckertova, Plenum Press NY (1980) (For Unit 4)
5. Thin Film Fundamentals (New Age International Publishers, New Delhi)
by A. Goswami
6. Nanoscience and Nanotechnology V. S. Muralidharan, A. Subramania (Ane Books
Pvt. Ltd.)(For unit V)
7. Encyclopedia of Nanoscience S. K. Prasad (Discovery Publishing house, New Delhi)

Materials Science

Paper: PH-18B   **Lectures: 45**   **Credits: 4**

Unit I: Types of Materials and Glass   (10 Lect.)

Materials Science: Introduction, Importance of materials, Types of materials, Typical materials behaviour, significant properties, Applications.

Glass: Types of glasses, Glass Manufacturing process, Ceramics: Types of ceramics, Processing ceramics, Concrete: properties of concretes, Constituents of concretes (Cement, Aggregate, Water, Admixtures), Characteristic of good concrete, Classification of concrete, properties of cement concrete, water proof concrete, R.C.C (properties, advantages and disadvantages, uses), Adhesives, abrasives, Application of concretes.

Unit II: Magnetic materials   (6 Lect.)

Terms related to Magnetic Materials, origin of magnetism, Classification of magnetic materials, Magnetic Domains, Magnetization, Magnetic anisotropy, Losses in magnetic materials, Factors effecting permeability and Hysteresis loss, soft and hard magnetic materials, Ferro fluids.

Unit III: Dielectric materials and Ferroelectric Materials: (12 Lect.)

Dielectric as an electric field medium, Leakage currents, Dielectric losses, Breakdown voltage and Dielectric strength, break down in solid dielectrics, liquid dielectrics, Gases as dielectrics, polarization, Electrical conductivity in solid liquid and gaseous dielectrics. Applications of dielectric materials

Common ferroelectric materials, Properties of ferroelectric materials in static field, spontaneous polarization, causes for existence of curie temperature, application of ferroelectric materials. Antiferroelectric materials, piezoelectric materials, pyroelectric materials

Unit IV: Bio Materials   (6 Lect.)

General aspects of good timber, Advantages and disadvantages of Timber, Uses of timber, Defects in timber, seasoning of timber, Decay of timber, Testing timber. Playwood, Lamin board, Black board, Fiber board, Hard Board.

Unit V: Materials Synthesis   (11 Lect.)

Solid State Reactions:general principles, processes of the reactions between solids, precursor, solution and gel methods, sealed tubes and special atmospheres, solution and hydrothermal methods, phase diagram and synthesis. Low temperature reactions, intercalation in layer structures, insertion compounds of metal oxides, ion exchange methods

Synthesis by different wet chemical techniques viz., sol-gel, combustion, emulsion and polyol methods, Self-propagation combustion reaction, precursor dependent process, Microwave assisted process, Hydrothermal bomb calorimeter-hydrothermal and solvo-thermal process, Interfacial growth materials between the two immiscible phases,

Reference books:
1. Elements of Materials Science and Engineering, L Van Vlack, 6th ed., Addison Wesley, MA, 1999.
2. Materials Science and Engineering; An Introduction, W D Callister, Wiley, 2002
3. Modern Perspectives in Solid-State Chemistry,C N R Rao and J Gopalkrishanan, 1998
4. Electronic Ceramics, L M Levinson, Marcel Dekker, NY, 1988.

Modern Digital Communication
Paper: PH-18C   **Lectures: 45**   **Credits: 4**

Unit I: Digital communication   (9 Lect.)
Introduction, synchronization, asynchronous transmission, probability of bit error in base band transmission. The matched filter optimal terminal filters, bit timing recovery, eye diagrams, digital carried Systems (ASK, FSK, PSK, DPSK, QPSK), carrier recovery circuits.

Unit II: Digital line waveforms   (9 Lect.)
Symbols, binits, bits, bauds, functional notation pulses, line codes and waveforms, M-arry encoding, inter symbol interferences, pulse shaping.

Unit III: Pulse modulation   (8 Lect.)
Introduction: PAM, PCM, PFM, PTM, PPM, PWM

Unit IV Base-band shaping for data transmission   (9 Lect.)
Discrete PAM signals, power spectra of discrete PAM signals, Nyquist's criterion for distortion less base-band binary transmission, correlative coding, eye pattern, base band M-ary PAM systems, adaptive equalization for data transmission.

Unit V: Digital modulation technique   (10 Lect.)
Digital modulation formats, Coherent binary modulation techniques, coherent quadrature modulation technique, Non-coherent binary modulation technique,

Comparison of binary and quarternary modulation techniques, M-ary, modulation techniques, synchronization and applications.

Reference Books:

1) Simon Haykin: Digital communications, John Wiley, 2003.

2) K. Sam Shanmugham: Digital and analog communication systems, John Wiley, 1996.

3) Simon Haykin: An introduction to analog and digital communication, John Wiley, 2003.

4) D Roddy and J Coolen: Electronics communication, PHI, 4/e, 1995.

5) B P Lathi: Modem digital and analog communication systems, Prism Books, 2/c 1993.

Nuclear Physics and Laser Lab (Practical Course)
Paper: PH-20   Lectures: 50   Credits: 4

Nuclear Physics Lab.
1) Gamma Ray Spectrometer-1(Calibration)
2) Determination of operating voltage of G.M. tube
3) Random Nature of Radioactive decay
4) Absorption coefficient of Al.
5) Determination of half life of In.
6) Dead time of G.M.tube using single source
7) Dead time of G.M.tube using double source
8) Inverse square law
9) Gamma ray spectrometer-2

Laser Lab
1. To determine the grating pitch of transmission grating using laser.
2. To find the refractive index of transparent glass plate by measuring Brewster angle using laser.
3. To observe diffraction pattern and to calculate the slit width using laser.
4. To determine the absorption coefficient of liquid (water) using laser.
5. To study the shape of laser beam cross-section and to evaluate beam spot size.
6. To find the refractive index if transparent bar using diode laser.
Note:-Every student should perform at least 10 practicals

Laser, Thin Film and Nanophysics Lab (Practical Course)

Paper: PH-21   **Lectures: 50**   **Credits: 4**

Laser Lab

1. To calculate the wavelength of laser using Michelson Interferometer.
2. To determine data track spacing on CDs using laser.
3. To determine the unknown concentration of the sugar solution using laser.
4. To determine the angle of wedge plate using laser.
5. To determine the refractive index of liquids using laser.
6. To determine and study the power distribution within the laser beam.

Thin Film and Nanophysics- Lab Work

List of Experiments:
1. Thin film deposition by Chemical bath deposition technique
2. Thin film deposition by Successive Ionic Layer Absorption and Reaction (SILAR)
3. Thin film deposition Deposition of electrodeposition
4. Crystal growth by gel technique
5. Measurement of Thermoelectric power
6. Determination of optical band gap
7. Study of Type of transition involved in optical absorption spectra of thin film
8. Photoconductivity Studies of thin film
9. Electrical Conductivity by Two Probe Method of thin film
10. Resistivity by Four probe method
11. Hall effect

Note:-Every student should perform at least 10 practicals

Fiber Optics and Optical fiber Communication

Paper: PH-22   **Lectures: 45**   **Credits: 4**

Unit (I) Ray theory of transmission and preparation of optical fibers   8 Lectures
Propagation of light in different media : propagation of light in an optical fiber, Basic structure and optical path of an optical fiber, Acceptance angle and acceptance cone, Numerical aperture(NA) (General), Modes of propagation, Meridional and skew rays, Number of modes and cut-off parameters of fibers.
Fiber Fabrication Techniques : Chemical vapour deposition technique, Double crucible method.

Unit (II) Losses and Dispersion in Optical Fiber   8 Lectures
Fiber Losses : Attenuation in optic fibers, Materials or impurity losses, Rayleigh scattering losses, Absorption loss, Leaky modes, Bending losses, Radiation losses. **Dispersion in optical fiber :** Electrical Vs. optical bandwidth. Bandwidth-length product, Intermodal dispersion, Mixing modes, Material chromatic dispersion.

Unit(III) Light Sources and Detectors for Optical Fiber   8 Lectures
Light Sources : Introduction, LED (Light Emitting Diode), Processes involved, structure material and output characteristics of LED, Fiber LED coupling, Bandwidth, Spectral emission of LEDs, LASERS : Operation types, Spatial emission pattern, Current Vs. output characteristics.**Detectors :** Introduction, Characteristics of photodetectors (General), hotoemissive type, Photoconductive and photo voltaic devices, PN junction type, PIN photo diode, Avalanche photo diode (APD).

Unit (IV) Fiber optic sensors, Communication systems and Modulation 11 Lectures
Fiber optic sensors : Introduction, Fiber optic sensors, Intensity modulated sensors, Micro bend strain intensity modulated sensor, Liquid level type hybrid sensor, internal effect intensity modulated sensor, Diffraction grating sensors and Interferometric sensors.
Communication systems : Transmitter for fiber optic communication, High performance transmitter circuit LED – Analog transmitter, LASER transmitter, Digital laser transmitter, Analog laser transmitter with A/D conversion and digital multiplexing, Fiber optic receiver, Fiber based modems : Transreceiver. **Modulation :** LED analog modulation, Digital modulation, Laser modulation, Pulse code modulation (PCM), Intensity modulation (IM).

Unit(V)Optical Fiber Communication and Measurements on Optical Fibers:10 Lectures

Optical fiber communication systems : Introduction, Important applications of integrated optic fiber communication technology, Long haul communication, Coherent optical fiber communication, Principle of coherent detection. **Measurements on Optical Fibers :** Introduction, Measurements of numerical aperture (NA), Measurements of Fiber- attenuation, Optical time Domain Reflectometry (OTDR), Measurements of dispersion losses, Measurements of refractive index, Cut-off wavelength measurement, Measurements of Mode Field Diameter (MFD), Near field scanning technique.

Reference Books:
1. Optical Fiber Communications : Principles and Practices- John M. Senior(Phi)

2. The Element of Fiber Optic- S.I.W. Meardon (Regend and Ph)
3. Optical Fiber Communication- G. Keiser (Mc Graw Hill)
4. Introduction to Fiber Optics- A. Ghatak and Tyagrajan (Cambridge University Press)
5. Optical Fiber Communication- Joseph C. Palais(Ph)
6. Fiber Optics- N.S. Kapany(Academic Press)
7. Optical Fiber and Optical Fiber Communication Systems S.K.Sarkar (S. Chand and Comp.)

Microwaves and Measurements

Paper: PH-23   **Lectures: 45**   **Credits: 4**

Unit – (I) Microwave Fundamentals 8 lectures

Microwave frequency spectrum, Types and characteristics of transmission line, Transmission line equation solution, Reflection coefficient and transmission coefficient, Standing wave and standing wave ratio, Line impedance and admittance, Smith chart.

Unit – (II) Microwave Passive Devices 8 Lectures

Rectangular wave guide, Circular wave guide, Microwave cavities, Microwave hybrid circuit, Directional coupler, Circulators and ferrit devices, Attenuators, Scattering matrix, Isolators.

Unit – (III) Microwave Active Devices 8 Lectures

Klystron, Reflex Klystron, Velocity modulation, Basic principle of magnetron, Principles and operations of magnetrons and traveling wave tube, Transfer electron devices, Gunn diode, Pin diode.

Unit – (IV) Microwave Measurements 8 Lectures

Attenuation measurement, Frequency measurement, Power measurement, Reflection coefficient and VSWR measurement, Scattering measurement. Microwave detection, Point contact diode, Schottly barrier diode, Impedance measurement using smith chart.

Unit – (V) Microwave Applications 13 Lectures

Antenna fundamental, Microwave antennas, Antenna basic, Power received from an antenna, Radiation pattern, Radiation resistance, Efficiency, Directivity and gain, Antenna types, Rectangular horn antennas, H and E plane Horn antennas, Pyramidal Horn antenna, Parabolic reflector antenna. Radar system, Basic radar system, Radar range, Moving target indicator, Time domain reflectometry, Network analyzer, Microwave dielectric measurement techniques.

Reference Books:

1. Microwave Devices and Circuits- Samull Y. Lio, Prentice Hall of India Pravate Limited, New Delhi.

2. Microwave Communications Components and Circuits- Hunds, Mc Graw Hill, International Edition.

3. Microwave Techniques- D.C. Agarwal, S. Chand and Company.

4. Microwave Engineering- David M. Pozar, John Wiley and Sons, New York.

5. Microwave Principles- Herbert S. Reich, C.B.S. Publications.

6. Microwave Propagation and Techniques- D.C. Sarkar, S. Chand and Company.

7. Microwave Fundamental- Sanjeeva, Gupta and Others, Khanna Publications.

8. Microwave Circuits and Passive Devices- Sisodia and Raghuvanshi, Wiley Easter Ltd.
9. Antenna Theory and Design- Warren L. Stutzman Gray A. Thiele, John Wiley and Sons, Inc.
 4

Microprocessors and Microcontrollers

Paper: PH-24   **Lectures: 45**   **Credits: 4**

UNIT – I : Architecture of Microprocessor 8085   **(12 lectures)**
 Intel 8085- Block diagram, ALU, Timing and control unit, Registers, Data and address bus, Pin configuration, Instruction word size, Instruction cycle, Fetch operation, Execute cycle, Machine cycle and state, Instructions and data flow, Timing diagram, Memory read, I/O read, Memory write, I/O write

Unit –II: Programming of Microprocessor 8085 and Data Transfer Techniques: (12 lectures)
Introduction, Instruction set for 8085, Programming of 8085, Assembly language programming (Data Transfer, Arithmetic, Branching, and Logical group). Programmed data transfer, Synchronous, Asynchronous and interrupt drivers modes, DMA, Serial data transfer.

Unit-III : Advanced Microprocessors (Intel Microprocessor 8086):   6 Lectures
Architecture of 8086, Pin diagram and pin function, Register organization, Minimum and Maximum mode of 8086, Microprocessor 80286, 80386 (Block Diagram only)

Unit – IV: Micro-controller 8051:   10 Lectures
Introduction to 8 - bit micro-controller, Architecture of 8051 signal description of 8051, Register set of 8051, Important operational features of 8051, Memory and I/O addressing by 8051, Interrupts of 8051, Instructions set of 8051, programming of 8051 (Simple Arithmetic and Logical programs).

Unit- V: 16 bit Micro-controller and Embedded Controller: 5 Lectures
Introduction, Architecture of 16 bit micro-controller (MCS-96 or 80196), General features of 80196, Register set of 80196, I/O processor, UPI 452 (Universal Peripheral Interface), Intel 80960 (block Diagram and its description only).

Reference Books:
1. Microprocessor Architecture, Progrmmining and Applications- R. Gaonkar, Wily-Eastern Ltd.
2. Microprocessor and Microcontroller- B. Ram, Dhanpati Rai and sons Delhi
3. Advanced Microprocessor and Principles- A.K. Ray, K.M. Bhurchandi Tata Mc Graw Hill Publication Co. Ltd. New Delhi.
4. The 8085 Basics, Progamming and Interfacing- U.V. Kulkarni and T.R. Sontakke, Sadhu Sudha Prakashan, Nanded.
5. Microprocessor and Digital Systems- Dauglas Hall, Tata Mc Graw Hill
6. Introduction to Microprocessor- A.P. Matur(TMH)
7. Advanced Microprocessor and Interfacing- B. Ram (TMH).
8. Microprocessor Architecture, Progrmmining and Applications With 8086 / 8080- R. Gaonkar, Wily-Eastern Ltd.

Energy Physics

Paper: PH-25A   **Lectures: 45**   **Credits: 4**

Unit – (I) Conventional and Non-conventional Energy Sources: 11 lectures

Man and energy, world production and reserves of commercial energy sources- fossil fuel, hydroelectric power, Nuclear energy ,Indian energy scenario- fossil fuel, hydroelectric power, Nuclear energy power plants, Non-conventional Energy Sources- scope and potential, Concept of Solar constant, Solar intensity on earth's surface, Direct and diffused radiation ,Measurements of Solar Radiations – Moll-Gorezynsky pyronometer, Sunshine Recorder

Unit – (II) Photovoltaic Conversion Technologies: 7 Lectures

Crystalline Solar Cell Technology- purification of Silicon conversion of metallurgical grade silicon to semiconductor grade- Czocharlski crystalline silicon formation process, Processes involved in the conversion of silicon wafer to solar cell ,Modular design of solar cell, Power generation through satellite solar power station, Advantages and Disadvantages of solar cell

Unit – (III) Photo thermal conversion technologies 13 Lectures

Basic principles of flat plate collector (FPC), elements of flat plate collector, selective coatings and ideal characteristics of absorber plate of flat plate collector, Solar cooker, Hot water system, Solar dryer, Solar pond, Design of central tower receiving system for power generation, Essential elements of Solar Concentrators, parameters and efficiency of solar concentrators, Cylindrical parabolid concentrators (PTC), Compound parabolid concentrators (CPC), Applications of solar concentrators

Unit – (IV) Biogas 7 Lectures

Principles of biogas production, The anaerobic digestion process, types of systems (standard and high rate system) proportion of gases in biogas, Design of the plant, process control consideration (temperature, pH), gas production, gas collection, gas utilization, Advantages and Disadvantages of biogas plant.

Unit – (V) Fuel Cells 7 Lectures

Hydrogen as source of energy, photo electrochemical cell, source of hydrogen, solar hydrogen through electrolysis and photo catalytic process, hydrogen storage, brief discussion of various processes, concept of fuel cell, thermodynamics of fuel cell, merits and demerits of fuel cell.

Reference Books:
1. Solar Energy -S. P. Sukhatme (TMH)
2. Solar Energy -Garg and Prakash (PHI)
3. Solar Cells -M. A. Green (PHI)
4. Biogas Technology -B. R. Veena (Ashish Pub. House)
5. Non conventional energy sources - G D Rai

Electronic Instrumentation

Paper: PH-25B   **Lectures: 45**   **Credits: 4**

Unit-I: Instrumentation   9 Lectures

Introduction, definition, purpose of instrumentation. Measurement, types of measurements, importance of measurements, classification of instruments, generalized measurement system, instrument characteristics, error, types of errors.

Unit-II: Transducers   9 Lectures

Definition, types of transducers, classification of transducers, resistive, inductive, capacitive, piezoelectric, photoelectric transducers. Temperature transducers, pressure and displacement transducers, strain gauges, optical transducers, detectors, biomedical electrode and transducers.

Unit-III: Electrical conductivity measurement   9 Lectures

Conductivity cell, AC electrodynamometer, pH measurements, pH meter. Automation in digital instruments, auto-zeroing, auto-ranging, automatic polarity indication. Digital storage oscilloscope.

Unit- IV: PC Instrumentation

PC for measurement and control: Role of PC in instrumentation, application of PC for measurement of displacement, temperature measurement and control. AC motor speed measurement and control.

Unit- V: Telemetry and data acquisition system   9 Lectures

Introduction, types of data acquisition system, basic elements of data acquisition system, sample and hold circuit. Digital instruments-DFM, DMM, Q meter, lock in amplifier, thickness measurement using LVDT, humidity Measurement. Recorders-X-Y recorder, strip chart recorder, magnetic tape recorder.

Reference books:

1) B. C. Nakra and K. K. Choudhri: Instumentation, measurement and analysis, TMH, 1995.

2) D. V. S. Murthy: Transducers and instrumentation, PHI, 1995.

3) Rajesh Hongal: DBM PC and clones.

Digital Signal Processing

Paper: PH-25C   **Lectures: 45**   **Credits: 4**

Unit–I: Introduction to digital signal processing   10 Lectures
Introduction of common applications of DSP, signal, classification of signals, signal processing systems, advantages of DSP over ASP. Elements of DSP systems. Review of discrete-time signals and systems-introduction, discrete time signals, discrete time systems, convolution of two discrete time signals, correlation of two discrete time signals, sampling of continuous time signals, reconstructions of signals from its sample values.

Unit –II: The Z transform and discrete Fourier transform   6 Lectures
Introduction, definition of Z transform, properties of Z transform, some common Z transform pairs, the inverse Z transform, system function.

Unit –III: Descrete Fourier Transform   9 Lectures
DFT Introduction, definition of DFT, properties of DFT, tabulations of properties of DFT, relationship between DFT and Z transform, linear convolution using the DFT. FFT algorithm-introduction, Geortzel algorithm, classification of FFT algorithm, decimation in time FFT algorithm, decimation in frequency in FFT algorithm.

Unit –IV: Realization of discrete time system   10 Lectures

Introduction, computational complexity, memory requirement, finite word length effects in the computations. Network structures for IIR systems-Direct form, transposed form, cascade form and parallel form network structures. Network structures for FIR systems-Direct form cascade form and frequency sampling network structure.

Unit –V: Digital filters   10 Lectures

Introduction, selection of filter, specification of the frequency response characteristics of the filter, phase response specifications, filter design. Comparison between digital and analog filters. Comparison between IIR and FIR digital filters, notch filters, comb filters, all pass filters and digital oscillators and resonators.

Reference Books:

1) A. V. Oppenheim and R W Schafer: Digital signal processing, PHI, 1985.

2) J.G.Proakis and D.G.Manolkis: Introduction to digital signal processing, McMillan, 1989.

3) Rabiner and Gold, Digital signal processing, PHI. 1999

4) Farooq Husain, Digital signal processing and applications, Umesh Publication, New Delhi, 2001.

Lab Course on Microwave and Fiber Optics Lab

Paper: PH-27   **Lectures: 50**   **Credits: 4**

Section-A Microwave Lab

1. Microwave bench and components setup study.
2. Characteristics of Reflex Klystron.
3. Characteristics of Gunn diode.
4. Study of Isolator, Circulator and Directional coupler,
5. To study Faraday rotator and determine Faraday rotation angle.
6. Measurement of VSWR / Reflection coefficient with different load.
7. Measurement of frequency of microwave source and establish relation between guided wavelength and free space wavelength.
8. Microwave detector characteristics.
9. To measure the performance of directional coupler.
10. To measure the performance of E-plane, H-plane and Magic tee.
11. Study of Horn antenna (Power distribution pattern).
12. To determine dielectric constant of solid using slotted section waveguide.
13. Dielectric constant of various liquids.

Section-B Fiber Optics Lab

1. Fiber end preparation launching of light into fiber.
2. Measurement of numerical aperture by zig method.
3. Measurement of numerical aperture by modal dispersion method.
4. Measurement of diameter of single mode fiber.
5. Determine the refractive index of glass slab and To study the total internal reflection.
6. Fiber to fiber (multimode) splice loss.
7. V-parameter of single mode fiber.

8. Loss measurement in single mode fiber.

9. Study of VDL (Visual diode laser).

a) Responsivity b) I / O Characteristics c) Inverse square law

10. Study of spectral response and spatial response of the detector.

11. To determine spatial, transverse and angular losses of a given multimode fiber.

12. To determine wavelength (λ) of laser source by diffraction grating.

13. To study the LED characteristics and determine the Plank's constant (h).

7

Microprocessor and Microcontroller Lab

Section-C

Microprocessor Lab

1. Write an ALP to transfer data bytes.

2. Write an ALP for various Arithmetic operations.

3. Write an ALP for different Logical operations.

4. Write an ALP to find out Smaller and Larger number.

5. ALP for port configuration of 8085 using 8255.

6. Study of 8255 (PPI).

7. Study of 8253 timer.

8. Study of 8257

9. Study of 8279

10. ALP for generation of Square wave

Section-D

Microcontroller Lab

1. Write an ALP for addition and verification by using 8051 microcontroller.

2. Write an ALP for subtraction and verification by using 8051 microcontroller.

3. Write an ALP for multiplication and verification by using 8051 microcontroller.

4. Write an ALP for division and verification by using 8051 microcontroller.

5. Write an ALP to find the 1's compliment 8 bit and 16 bit number using 8051 microcontroller.

6. Write an ALP to find the 2's compliment 8 bit and 16 bit number using 8051 microcontroller.

7. Write ALP for ascending /descending order of data.

8. Interfacing of seven segment display.

Note – Every student should perform at least 16 practical by choosing at least four (04) practical from each section.

The students can have their own choice to perform any two experiments outside from the list above, available in their laboratory.

Lab work marks distribution

1. Experiment------- 50

2. Oral --------------- 15

3. Record Book ----- 10

PROJECT WORK AND SEMINAR Paper: - PH – 24

Paper: PH-28   **Lectures: 45**   **Credits: 4**

1. Project work: 75Marks

The student has to work on some current topic and write a Dissertation / Thesis on the Investigations carried out independently or in association with a research group

in the Campus of S.R.T.M.Univrsity Nanded or a reputed State or National Research Institute.

2. Seminars: 25 Marks

Every student will have to prepare for a seminar on a topic allotted to him. He will have to present it in the form of written report as well as orally at the time of Examination.

Distribution of Marks

1. Dissertation / Thesis --75 Marks

2. Seminar ----------- 25 Marks

Swami Ramanand Teerth Marathwada University, Nanded.

B.Sc. Second Year
Zoology

Choice Based Credit System (CBCS) Course Structure
Semester Pattern Syllabus
w.e.f. June 2017

Swami Ramanand Teerth Marathwada University, Nanded
Choice Based Credit System (CBCS) Course Structure
Faculty of Science
B. Sc. Second Year Syllabus
Semester Pattern effective from June 2017
Subject: Zoology

Semester	Course No.	Name of the Course	Instructions Hrs/ Week	Total Periods	Marks for Internal (CA)	Marks for External (ESE)	Total Marks	Credits
III	CCZ III (Section A)	Genetics (P-VI)	03	45	10	40	50	02
	CCZ III (Section B)	Comparative Anatomy and Physiology (P-VII)	03	45	10	40	50	02
	CCZP II [CCZ III & IV (Section A)]	Practical's based on P-VI & P-VIII (P-X)	03 03	Practical's 10 10	05 05	20 20	25 25	01 01
	SECZ I	SEC I (Anyone Skill from optional)	02	02 + 01 = 03	25 (15 + 10)	25 (10+10+ 05)	50	(02)*
IV	CCZ IV (Section A)	Genetic Engineering and Evolution (P-VIII)	03	45	10	40	50	02
	CCZ IV (Section B)	Endocrinology, Histology and Biochemistry (P-IX)	03	45	10	40	50	02
	CCZP III [CCZ III & IV (Section B)]	Practical's based on P-VII & P-IX (P-XI)	03 03	Practical's 10 10	05 05	20 20	25 25	01 01
	SECZ II	SEC II (Anyone Skill from optional)	02	02 + 01 = 03	25 (15 + 10)	25 (10+10+ 05)	50	(02)*
Total Marks and Credits Semester III and IV					**110**	**290**	**400**	**12(04)***

(**CCZ-** Core Course Zoology**; CCZP-** Core Course Zoology Practical; **CA-** Continuous Assessment;

ESE – End of Semester Examination; **SECZ-** Skill Enhancement Course Zoology)

SEC   **CA - 25 :** Seminar – 15 & Test – 10
        ESE - 25 : Report Submission – 10; Presentation – 10 & Overall Skill Judgment – 05

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure
B. Sc. Second Year (Semester- III)
Semester Pattern effective from June -2017

Zoology

CCZ III (Section A)

GENETICS (P-VI)

Credits: 02 (Marks: 50)   Periods: 45

Unit – I   **11**
1) Introduction to Genetics
2) Mendelism
i) Mendel's Laws of inheritance
ii) Monohybrid, dihybrid cross and ratio.
iii) Incomplete dominance.
iv) Back cross and test cross.
3) Interaction of genes
i) Complementary factor (9:7)
ii) Supplementary factor (9:3:4)
iii) Inhibitory factor (13:3)
iv) Duplicate genes (15:1)
v) Lethal genes (1:2:1)

Unit – II   **11**
1) Multiple Alleles and Genes
i) Inheritance of ABO Blood groups in Man.
ii) Rh factor and Erythroblastosis foetalis in man.
iii) Multiple genes – skin pigmentation in man.
2) Linkage and Crossing over
i) Linkage – definition, types and significance
ii) Crossing over –
    a) Mechanism of crossing over,
    b) Factor affecting crossing over,
    c) Significance of crossing over.

Unit – III   **12**
1) Sex determination
i) Chromosomal methods of sex determination.
ii) Bridge's ratio theory of genic balance.
2) Sex linked inheritance
i) Sex linked inheritance in Drosophila.
ii) Sex linked inheritance in man – colourblindness, haemophilia, Hypertrichosis
3) Cytoplasmic Inheritance-Ex. Kappa Particles (Paramecium)

4) Mutation
i) Chromosomal mutations – Structural alterations & Numerical alteration (Polyploidy).
ii) Gene mutations – Sickle Cell Anaemia.
iii) Mutagenic agents.

Unit – IV 11
1) Human Genetics
i) Syndromes – *Turner, Klinefelter, Down, Cat – Cry, patus.*
ii) Inborn errors of metabolism – Phenylketonuria (PKU), Alkaptonura, Albinism.
iii) Human pedigree analysis with symbols.
2) Nature and functions of genetic materials.
i) DNA – structure, functions and replications
ii) RNA – Structure, types and functions.
iii) Genetic code

REFERENCES BOOKS
1. Genetics – P.K. Gupta (Rastogi Pub. Meerut)
2. Genetics – Verma P.S. and Agarwal V.K. (S. Chand Publications, Delhi.)
3. Cytology, Genetics and Evolution – P.K. Gupta (Rastogi Publications, Delhi)
4. Elementary Genetics – Single tone
5. Genetics – Winchester (Oxford LBH Publications)
6. Concepts of Genetics – W.S. Clug (Pearson Education ISBN)
7. Genetics – Strickberger (Prentice – Hall)
8. Principle of Genetics – R.H. Tamarin (Tata Mc Graw Hill Publications India)
9. Concepts of Genetics – R. L. Kotpal (Rastogi Publications)
10. Foundations of Genetics – Pai A.C. (Mc Graw Hill Publications)
11. Molecular Genetics – Gunther, S. Stent, (Macmillon)
12. Principles of Genetics – Sinnott, Dunn and Dobzansky (Tata McGraw Hill Pub. Delhi).
13. Genetic – Sarin C. (Tata McGraw Hill Publications, Delhi)
14. Text Book of Genetics – H. S. Bhamrah (Amol Pub. New Delhi.)
15. Genetics – M. P. Arora (Himalaya).
16. Genetic – Veer Bala (Rastogi Publication)
17. Cytology and genetics – Dyansagar V. R. (Tata McGraw Hill Pub. 1992 Reprint)
18. Manual of Practical Zoology – P. K. G. Nair and K. P. Achar (Himalaya Publication)
19. A Textbook of Practical Physiology – V. G. Ranade (P. V. G. Prakashan Pune.)

Swami Ramanand Teerth Marathwada University Nanded
Choice Based Credit System (CBCS) Course Structure
B. Sc. Second Year (Semester- III)
Semester Pattern effective from June -2017
Zoology
CCZ III (Section B)
COMPARATIVE ANATOMY AND PHYSIOLOGY (P-VII)
Credits: 02 (Marks: 50)   Periods: 45

Unit –I   11
1) Comparative Anatomy of Vertebrates
i) Integument
ii) Heart
iii) Kidney

Unit –II   11
1) Enzymes
i) Nature and Classification of enzymes.
ii) Mechanism of enzyme action.
iii) Factors affecting on enzymes activity.
2) Nutrition
i) Digestion of carbohydrates, proteins and lipids.
ii) Vitamins – Fat soluble and Water soluble vitamins
(Sources, deficiency diseases and effects)

Unit –III   11
1) Respiration
i) Definition of Aquatic and Aerial respiration.
ii) Respiratory organs in man.
iii) Mechanism of respiration.
iv) Transport of O_2 and CO_2

2) Circulation
i) Blood – composition and functions.
ii) Structure and working of heart.
iii) E.C.G. and Blood Pressure.
iv) Blood clotting.

Unit- IV   12
1) Excretion
i) Modes of excretion in animals (Ammonotelism,Ureotelism and Uricotelism)
ii) Structure of kidney (V.S.)
iii) Structure of uriniferous tubules.
iv) Physiology of urine formation.
v) Composition of urine.

2) Nerve Physiology
i) Structure and types of neurons.
ii) Structure of synapse.
iii) Conduction of nerve impulse.
3) Muscle Physiology
i) Types of muscles- smooth muscles, skeletal muscles and cardiac muscles.
ii) Ultra structure of skeletal muscles.

REFERENCES BOOKS

(Anatomy)
1. Comparative anatomy of vertebrates – Kent C. G.
2. Outlines of comparative Anatomy of Vertebrates – Kingsley C. G. (Central Book Depot Allahabad)
3. An Introduction of Vertebrates Anatomy – Messers H. M.
4. Comparative Anatomy – Montagna W., John Wiley and Sons Inc.

(Physiology)
1. Manual of Practical Zoology – P. K. G. Nair and K. P. Achar (Himalaya Pub.)
2. Eckert R. Animal Physiology (W. H. Freeman)
3. A Textbook of Animal Physiology – K. A. Goel and K. V. Shastri (Rastogi Pub.)
4. A Textbook of Practical Physiology – V.G. Ranade (P. V. G. Prakashan Pune.)
5. Animal Physiology – A. Maria Kyttikan and N. Armugam (Saras Pub.)
6. Biochemistry – Arumugam et.al, (Saras Pub.)
7. Clinical Pathology and Haematology – Nanda Baheti (Kanhaiya Pub.)
8. Comparative Animal Physiology - C. Ladd Prosser.
9. Experimental Physiology – S. C. Rastogi (Wiley Eastern Ltd. London)
10. Human Physiology - Vander A. J., Sherman J. H. and Luciano D. S. (Mc Graw Hill London)
11. Medical Laboratory Techniques – Ramni Sood (Jaypee Brothers medical Pub. Pvt. Ltd. New Delhi).
12. Principles of Anatomy and Physiology – Tortora G. H. and Grabowasky S. R. (Harper Collins College Publication)
13. Text book of Animal Physiology – A. K. Berry (Emkay Publications, Delhi)
14. Principles of Animal Physiology – D. W. Wood
15. Physiology – Guyton and Hall

Swami Ramanand Teerth Marathwada University Nanded
Choice Based Credit System (CBCS) Course Structure
B. Sc. Second Year (Semester- IV)
Semester Pattern effective from June -2017
Zoology
CCZ IV (Section A)
GENETIC ENGINEERING AND EVOLUTION
(P-VIII)

Credits: 02 (Marks: 50)   Periods: 45

UNIT - I   **12**
1) Introduction of Genetic Engineering
2) Recombinant DNA Technology
i) Tools: - A) Enzymes: -   a) Lysing   b) Ligases   c) Nucleases (Exonucleases, Endonucleases, Restriction Endonucleases)   d) Synthetases (DNA polymerase, Reverse transcriptase)
B) Vectors: - Cloning vectors
    (Plasmid -psBR322, Bacteriophage-Lambda phage, Virus-SV40, Cosmid vectors)
3) Techniques: -
i) Gel-Electrophoresis
ii) PCR (Polymerase Chain Reaction)
iii) Southern, Northern and Western Blotting.

UNIT- II   **11**
1) Construction of rDNA
2) c-DNA libraries and Genomic libraries
3) Transgenesis and Transgenic animals (Transgenic cattle, sheep, pig and fish)
4) Cloning and cloned animals (Dolly sheep)
5) DNA fingerprinting.

UNIT- III   **11**
1) Concept of Evolution
2) Theories of organic evolution
i) Lamarck's theory
ii) Darwin's theory
iii) Modern synthetic theory-Neo-Darwinism
iv) Hugo De Vries theory

UNIT- IV   **11**
1) Evidences of organic evolution
a) Anatomical b) Embryological
c) Paleontological d) Biochemical
2) Adaptations:-Aquatic, Terrestrial, Fossorial, Volant and Desert.
3) Hardy-Weinberg's law

REFERENCES BOOKS
1. Genetics – P.K. Gupta (Rastogi Pub. Meerut)
2. Genetics – Verma P.S. and Agarwal V.K. (S. Chand Pub. Delhi.)
3. Cytology, Genetics and Evolution – P.K. Gupta (Rastogi Pub. Delhi)
4. Elementary Genetics – Single tone
5. Genetics – Winchester (Oxford LBH Pub.)
6. Genetics and Evolution – A.P. Jha (Macmillon India)
7. Concepts of Genetics – W.S. Clug (Pearson Education ISBN)
8. Genetics – Strickberger (Prentice – Hall)
9. Principle of Genetics – R.H. Tamarin (Tata Mc Graw Hill Pub. India)
10. Concepts of Genetics – R. L. Kotpal (Rastogi Pub.)
11. Genetics and Genetic Engineering – Dr. R.P. Meyyan (Saras Pub.)
12. Foundations of Genetics – Pai A.C. (Mc Graw Hill Pub.)
13. Molecular Genetics – Gunther, S. Stent, (Macmillon)
14. Principles of Genetics – Sinnott, Dunn and Dobzansky (Tata McGraw Hill Pub. Delhi).
15. Genetic – Sarin C. (Tata McGraw Hill Pub. Delhi)
16. Organic Evolution – M.P. Arora (Himalaya Pub. House)
17. Evolution – M.W. Strickberger (CB Publishers)
18. Organic Evolution – N. Armugam (Saras Pub.)
19. Principles of Gene Manipulation and Introduction of Genetic Engineering R. W. Old and S. B. Primerose.
20. Text Book of Genetics – H. S. Bhamrah (Amol Pub. New Delhi.)
21. Genetics – M. P. Arora (Himalaya).
22. Genetics and Evolution – N. Armugam (Saras Pub.)
23. Genetic – Veer Bala (Rastogi Pub.)
24. Evolution – Moody
25. Evolution – Gopalkrishnan
26. Cytology and genetics – Dyansagar V. R. (Tata McGraw Hill Pub. 1992 Reprint)
27. Organic evolution – Harjendra Singh and C. M. Chaturvedi (Amul Pub.)
28. Manual of Practical Zoology – P. K. G. Nair and K. P. Achar (Himalaya Pub.)

Swami Ramanand Teerth Marathwada University Nanded
Choice Based Credit System (CBCS) Course Structure
B. Sc. Second Year (Semester- IV)
Semester Pattern effective from June -2017
Zoology
CCZ IV (Section B)
ENDOCRINOLOGY, HISTOLOGY AND BIOCHEMISTRY (P-IX)

Credits: 02 (Marks: 50)   Periods: 45

Unit – I   **11**
1) Endocrinology
i) Pituitary gland
ii) Thyroid gland
iii) Adrenal gland
iv) Islet's of Langerhans (Pancreas)
v) Menstrual Cycle.

Unit – II   **12**
1) Histology of mammalian organs and tissues.
i) Stomach ii) Intestine iii) Pancreas iv) Liver v) Kidney vi) Testes vii) Ovary.

Unit – III   **11**
1) Carbohydrate metabolism:
i) Glycogenesis, Glycogenolysis and Gluconeogenesis
ii) Glycolysis
iii) Krebs's cycle

Unit – IV   **11**
1) Protein metabolism :
i) Deamination and Transamination
ii) Ornithine cycle.
2) Lipid metabolism :
i) B-Oxidation
ii) Ketosis, Ketogenesis and Ketolysis.

REFERENCES BOOKS
(Endocrinology)
1. Williams Text Book of Endocrinology – Tenth Edition, Saunders, 2003.
2. Endocrinology – Mac E. Hadley, Fifth Edition, Pearson Education, 2004.
3. Molecular Endocrinology – Bolander, F.F., Academic, Son–Diego, 1989.
4. Textbook of Endocrinology – Griffin J.E., S.R. Ojeda, Oxford, New York, 1988.
5. Basic and Clinical Endocrinology – Greenspan, F.S., 3rd Edi., Appleton and Lange.
6. Basic Medical Endocrinology – Goodman, H.M., Raven, New York, 1988.
7. Hormones : From Molecules to Diseable, Bailiene, E.E. & P.A. Kelly, Herman, NewYork, 1991.

(Histology)
1. Bailey's Textbook of Histology – Williams and Wilkins (Baltmore and Scientific Book Agency, Culcutta Copenhaver W. M.).
2. Text book of Histology – Bloom W. and Fawcett D. W.
3. Histology of Mammals – Athavale M. V. and latey A. N.
4. Histology – Lippinocott, Han A. W.
5. Human Histology – Leslie Brainerd Arey (Khosla Pub. House, Delhi)

(Biochemistry)
1. Tools of Biochemistry – T. G. Cooper.
2. Biochemistry – C. B. Power (Himalaya Pub.)
3. Outline of Biochemistry – Conn. E.E. and Stumpf P. V.
4. Biochemistry – Leninger A. L.
5. Biochemistry – Das.
6. Textbook of Biochemistry – Rao K. R.
7. Textbook of Biochemistry West E. S., Todd W. R. Mason H. S. and VanBruggen J. T.

Swami Ramanand Teerth Marathwada University Nanded
Choice Based Credit System (CBCS) Course Structure
B. Sc. Second Year Semester Pattern effective from June - 2017
ZOOLOGY
PRACTICAL PAPER NO. - X
Based on P-VI & P-VIII
Genetics, Genetic Engineering and Evolution
Practical Paper: CCZP II [Based on CCZ III & CCZ IV (Section A)]

Credits: 02   Marks: 50

1. Problems based on Monohybrid and Dihyrid cross.
2. Problems based on interaction of genes (Complementary, Supplementary, Inhibitory Duplicate factors)
3. Problems based on blood group inheritance in man.
4. Problems based on sex linked inheritance.
5. Culture of Drosophila and its observation of genetic characters likes eyes and wings.
6. Preparation of temporary slides of salivary gland chromosomes from chironomous larva .
7. Study of permanent slide of sickle cell anaemia.
8. Study of chromosomal abnormalities in man with the help of photographs/charts and Karyotypes
    a) Down's syndrome
    b) Klinfelter's syndrome
    c) Turner's syndrome
9. Human pedigree analysis- various symbols used.
10. Estimation of DNA by Diphenyl amine (DPA method)
11. Study of human genetic traits (Rolling tongue, Length of index and ring finger, ear lobes) by using Hardy Weinberg's principle.
12. Calculation of frequencies of recessive and dominant gene in a population by using Hardy Weinberg Principle.
13. Calculation of heterozygote and homozygote in population by using Hardy Weinberg's principle.
14. Study of evidences by using photograph/charts and models
    a) Analogous and Homologous organs
    b) Connecting link (Peripatus and Archaeopteryx)
    c) Embryological evidences
15. Study of adaptations (Museum Specimens).

Note: Demonstration of animal Dissections through Models, Charts and Computer Aided Techniques as per U.G.C Guidelines.

Swami Ramanand Teerth Marathwada University Nanded
Choice Based Credit System (CBCS) Course Structure
B. Sc. Second Year Semester Pattern effective from June - 2017
ZOOLOGY
PRACTICAL QUESTION PAPER PATTERN - X
Based on P-VI & P-VIII
Genetics, Genetic Engineering and Evolution
Practical Paper: CCZP II [Based on CCZ III & CCZ IV (Section A)]

Credits: 02 (Marks: 50)   Time: 04 Hrs

Q.1)   Solve one problem from monohybrid cross and one problem from dihybrid cross.   (05)

Q.2)   Solve one problem based on blood group inheritance.   (05)
OR
Solve any one problem based on sex-linked inheritance.

Q.3)   Solve any two problems on Interaction of genes.   (10)
(Complementary, Supplementary, Inhibitory Factors, Duplicate genes.)

Q.4)   Identification of human syndromes (any two)   (05)
OR
Preparation of temporary mount of salivary gland chromosomes of chironomous larvae.
OR
Observation of genetic characters of Drosophila.

Q.5)   Identify and Comments on as per instructions.   (05)
a) Humans pedigree analysis (Any five symbols)
b) Sickle cell anaemia –slide/photograph/ charts.
OR
Problems based on Hardy- Weinberg Principle for the calculation of ………….
OR
Estimation of DNA by DPA Method.

Q.6)   Identify and comments on as per the instructions.   (10)
a) Adaptations (any two) Aquatic, Terrestrial, Aerial/ Volant, Fossorial, Desert
b) Evidence (any two) Analogous and Homologous organs, Connecting links, Embryological evidence

Q.7)   Submission of Record Book and Viva- Voce   (10)

Note: Demonstration of animal Dissections through Models, Charts and Computer Aided Techniques as per U.G.C Guidelines.

Swami Ramanand Teerth Marathwada University Nanded
Choice Based Credit System (CBCS) Course Structure
B. Sc. Second Year Semester Pattern effective from June - 2017
ZOOLOGY
PRACTICAL PAPER NO. - XI
Based on P-VII & P-IX
Comparative Anatomy and Physiology
Endocrinology, Histology and Biochemistry
Practical Paper: CCZP III [Based on CCZ III & CCZ IV (Section B)]

Credits: 02   Marks: 50

1) Qualitative detection of digestive enzymes (Protease, Amylase and Lipase) in cockroach.
2) Detection of human salivary amylase.
3) Estimation of oxygen consumption in fish or any other suitable aquatic animal.
4) R.B.C. counting.
5) W.B.C. counting.
6) Estimation of Haemoglobin.
7) Detection of blood groups.
8) Measurement of B.P. by using B.P. apparatus (Demonstration only).
9) Qualitative detection of nitrogenous waste products (Ammonia, Urea, Uric acid) in bird's excreta and urine of Mammals.
10) Preparation of Haematin crystals.
11) Temporary preparation of squamous epithelium, ciliated epithelium, skeletal muscle fiber and blood smear.
12) Study of histological structure of following organs – stomach, intestine, pancreas, liver, kidney, testis, ovary, thyroid and pituitary.
13) Structure of synapse, structure of neurons (slide/chart)
14) Types of nerve cells - Unipolar, Biopolar, Multipolar (Slides)
15) Location of endocrine glands through charts or models.
16) Preparation of block.
17) Compulsory educational excursion tour to visit various zoological important centers.

Note: Demonstration of animal Dissections through Models, Charts and Computer Aided Techniques as per U.G.C Guidelines.

Swami Ramanand Teerth Marathwada University Nanded
Choice Based Credit System (CBCS) Course Structure
B. Sc. Second Year Semester Pattern effective from June - 2017
ZOOLOGY
PRACTICAL QUESTION PAPER PATTERN - XI
Based on P-VII & P-IX
Comparative Anatomy and Physiology
Endocrinology, Histology and Biochemistry
Practical Paper: CCZP III [Based on CCZ III & CCZ IV (Section B)]

Credits: 02 (Marks: 50)   Time: 04 Hrs

Q.1) Qualitative detection of digestive enzymes (Protease, Amylase and Lipase) in   (10)
      Cockroach

                                        OR

      Detection of human salivary amylase

Q.2) Estimation of O_2 consumption in fish or any suitable aquatic animal   (10)

                                        OR

      Detect any two nitrogenous waste products.

Q.3) Estimate the haemoglobin percentage in a given sample of blood   (05)

                                        OR

      Measurement of blood pressure in Man

Q.4) Counting of R.B.C. / W.B.C. in blood sample provided   (05)

                                        OR

      Prepare haematin crystals from blood sample provided

                                        OR

      Detection of blood groups from given sample

Q.5) Identify any two endocrine glands in charts/ models provided   (05)

                                        OR

      Preparation of block from given tissue

Q.6) Identify and describe the two histological slides   (05)

Q.7) Viva-voce, and excursion report   (05)

Q.8) Record book   (05)

Note: Demonstration of animal Dissections through Models, Charts and Computer Aided Techniques as per U.G.C Guidelines.

Swami Ramanand Teerth Marathwada University Nanded
Choice Based Credit System (CBCS) Course Structure
B. Sc. Second Year Semester Pattern effective from June - 2017
Skill Enhancement Course (SEC)
ZOOLOGY

Silent Features of the Skill

Zoology is the study of animal biology in all its aspects, from cells to population and from neurons to behavior. Zoology skill courses provide you with specific scientific recent knowledge. The course will help to asses prior basic knowledge of zoology at UG level and will refresh the applied zoology to prepare students for a carrier as a zoologist or researchers. The main aim of the skill based course is to train the students in a wide range of zoological science based skills that provide the learning base of future carriers in discipline such as health science, publishing, teaching, research and management.

Utility : At the end of course, student should be –

1. Able to analyze, study and report on material learned.

2. Able to assess the scope of animal biology and select appropriate area for further study.

3. Able to integrate related topic from separate parts of the course.

Learning Objectives :

1. The subject aims to provide a broad multidisciplinary course in zoology.

2. To promote training in practical and conceptual skills in biology.

3. To improve students for global competition and their chances of employment.

4. To equip students with adequate practical knowledge that will enable them be self reliant and captain of biomedical, agro-aqua cultural, environmental and human development industries.

5. To equip students with adequate research techniques that will enable them towards the perfection for national and global economics.

Prerequisites :

1. General Biology

2. Cell Biology

3. Genetics

4. Physiology

5. Ecology

6. Computer Knowledge.

Swami Ramanand Teerth Marathwada University, Nanded
CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER PATTERN
Faculty of Science
B.Sc. Second Year, Semester – III
SEC – I : Skills for 02 Credits
w. e. f. Academic Year June 2017
(02 Periods, 01 Theory Per week: Max. Marks : 50)

PROPOSED SKILLS IN ZOOLOGY FOR B.SC. II YEAR SEMESTER - III

Skill Enhancement Course
SECZ – I (A) : HAEMATOLOGY

UNIT – I
1. Introduction - Definition, Components, Cells – Structure and Functions of cells, Lymph.
   - Collection of Blood- Collection of capillary blood by skin puncture, Collection of blood by Venipuncture, Collection of arterial blood, Criteria for sample collection.
- Practical – Collection of blood by Venipuncture and arterial blood.

UNIT – II
2. Anticoagulants - Definition, Action of E. D. T. A., Oxalates, double oxalates, fluorides, acid citrate, detxtrose-trisodium citrate, heparin.
   - Effect of anticoagulants on blood cell morphology.
3. Haemoglobin - Normal structure and various haemoglobin, Determination of haemoglobin by various methods.
   - Anaemia.
- Practical – Determination of haemoglobin from given blood sample, Clotting and bleeding time of blood.

UNIT – III
4. Study of Blood Cell Count - Total WBC Count, Total RBC Count, Platelets Count, Absolute Eosinophil Count, Reticulocyte Count.
- Practical – Determination of Total Count of RBC, WBC.

UNIT – IV
5. Study of Blood Smear for differential WBC Count - Preparation and Staining of smears, Counting Methods, Morphology of White cells, Types of White Cells, Abnormalities in morphology of blood cells and related diseases.
- Practical – Determination of differential WBC Count by blood Smear.

REFERENCE BOOKS:
1. Medical Laboratory Technology - Ramnik Sood
2. Medical Lab Technology Vol. I, II & III – Kanai Mukherjee
3. Hand Book of Medical Technology - Mrs. Chitra
4. Medical Laboratory Technology – A. Ananthanarayan
5. Manual for Laboratory Technician of Primary Health by Minister of Health
6. Human Physiology Vol. I & II – C. C. Chatterjee

Swami Ramanand Teerth Marathwada University, Nanded
CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER PATTERN
Faculty of Science
B.Sc. Second Year, Semester – III
SEC – I : Skills for 02 Credits
w. e. f. Academic Year June 2017
(02 Periods, 01 Theory Per week: Max. Marks : 50)

PROPOSED SKILLS IN ZOOLOGY FOR B.SC. II YEAR SEMESTER - III

Skill Enhancement Course
SECZ – I (B) : URINOLOGY

UNIT - I
1. Definition, Structure and Functions of Urinary System, Physiology of Mechanism of Urine formation.

UNIT - II
2. Constituents and composition of Urine
    i) Normal constituents and abnormal constituents of Urine- i) Qualitative tests for sugar, albumin, ketone bodies, bile salts and bile pigments.
- Practical – Study of normal and abnormal constituents of Urine.

UNIT - III
3. Renal Function Tests
    i. Definition, importance of tests like urea, creatinine, uric acid, proteins
    ii. Importance of Dialysis
- Practical- Biochemical Qualitative and Quantitative tests for urine.

UNIT - IV
4. Collection and preservation of Urine Sample
    i. Physical and Chemical Examinations of abnormal constituents.
    ii. Microscopic Examination of urine
    iii. Preparation of Urine Report
    iv. Urinometer.
- Practical- Study of Microscopic Examination of urine.

REFERENCE BOOKS
7. Medical Laboratory Technology - Ramnik Sood
8. Medical Lab Technology Vol. I, II & III – Kanai Mukherjee
9. Hand Book of Medical Technology- Mrs. Chitra
10. Medical Laboratory Technology – A. Ananthanarayan
11. Manual for Laboratory Techniian of Primary Health by Minister of Health
12. Human Physiology Vol. I & II – C. C. Chatterjee

Swami Ramanand Teerth Marathwada University, Nanded
CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER PATTERN
Faculty of Science
B.Sc. Second Year, Semester – IV
SECZ – II : Skills for 02 Credits
w. e. f. Academic Year June 2017
(02 Periods, 01 Theory Per week: Max. Marks : 50)

PROPOSED SKILLS IN ZOOLOGY FOR B.SC. II YEAR SEMESTER - IV

Skill Enhancement Course
SEC – II (C) : HISTOTECHNOLOGY

UNIT - I
1. Introduction – Definition of Histotechnology
2. Methods of examination of tissues and cells, Collection and labeling of specimens, Methods of preparation and examination of tissues (fresh and fixed tissue)

UNIT - II
3. Fixation of tissue - Definition, Criteria for an ideal fixative, types (Simple and Compound), Properties of Simple and Compounds fixatives (Microanatomical, cytological and histochemical)
- Practical – Isolation and collection of tissue, fixing and block preparation.

UNIT - III
4. Tissue processing - Manual and automatic tissue processing, Different embedding media, Steps of tissue processing (Dehydration, Clearing, Impregnation).
5. Embedding- Methods of Embedding, Embedding medium, names of medium and moulds, Automatic Tissue Processes (Structure and Working, Advantages and Disadvantages).
- Practical – Tissue processing of prepared blocks.

UNIT - IV
6. Section Cutting - Types of Microtome, Rotary Microtome -Parts and their functions, Microtome Knives- Types, Care and Maintenance Techniques of sharpening; Technique of Section Cutting, Preparation of Adhesive Mixture, Mounting.
7. Staining - Definition and Significance of Staining, Stain and Staining Types, Theory of Staining, Methods of Staining.
- Practical – Section Cutting, fixing, alcohol grading, staining and preparation of permanent slide.

REFERENCE BOOKS:
1. Histochemical Techniques – J. D. Bancrot.
2. Handbook of Histopathological and Histochemical Techniques - C.F.A. Culling.
3. Histological and Histochemical Methods 4th Edition **–** John Kiernan.

Swami Ramanand Teerth Marathwada University, Nanded
CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER PATTERN
Faculty of Science
B.Sc. Second Year, Semester – IV
SECZ – II : Skills for 02 Credits
w. e. f. Academic Year June 2017
(02 Periods, 01 Theory Per week: Max. Marks : 50)

PROPOSED SKILLS IN ZOOLOGY FOR B.SC. II YEAR SEMESTER - IV

Skill Enhancement Course
SEC – II (D) : APICULTURE

UNIT – I   : BIOLOGY OF BEES
1. History, Classification and Biology of Honeybees.
2. Social Organization of Honey bees.

UNIT – II : REARING OF HONEY BEES
3. Artificial Bee Rearing (Apiary), Believes – Newton and Langstroth, Bee Pasturage, Selection of Bee Species for apiculture, Bee keeping equipment, Methods of extraction of honey (Indigenous and Modern).
- Practical - Visit to the Apiculture centers, Collect practical information of artificial Bee Hives and its mechanism.

UNIT – III : DISEASES AND ENEMIES
4. Bee diseases and enemies, Control and preventive measures.

UNIT – IV : ECONOMY OF BEES AND ENTREPRENEURSHIP
5. Products of Apiculture industry and its uses (Honey, Bee wax, Propolis, Pollen etc.).
6. Bee keeping industry – Recent efforts, Modern methods in employing artificial believes for Cross pollination in horticulture gardens.
- Practical – Collection of natural bee hives, wax, honey etc.

REFERENCE BOOKS:
1. Apiculture - Prost, P. J. (1962), Oxford and IBH, New Delhi.
2. Apiculture - Bisht D. S., ICAR Publications.
3. Bee Keeping in India - Indian Council of Agricultural Research, New Delhi.