



RANI CHANNAMMA UNIVERSITY, BELAGAVI

WEL-COME

**TO THE COURSE STRUCTRE AND SYLLABUS OF UNDERGRADUATE
PROGRAMMES – B.Sc**

VI Semester

w.e.f.

Academic Year 2016-17 and onwards

1. PHYSICS

w.e.f 2019-20 and onwards

B. Sc. VI Semester

PHYSICS (OPTIONAL)

Paper I

**Physics 6.1: SOLID STATE PHYSICS, NUCLEAR PHYSICS, ENERGY SOURCES,
DIGITAL ELECTRONICS AND SPECIAL MATERIALS (Total Hours: 50)**

17BSCPHYT61

UNIT I

SOLID STATE PHYSICS

Crystal structure : Lattice, Lattice translational vectors, Basis of crystal structure, Types of unit cells, Coordination numbers, Seven crystal system, Bravais lattices, Miller Indices, Expression for inter planar spacing, Crystal structure of NaCl and KCl.

Crystal diffraction : X-Ray diffraction. Bragg's law, Bragg's X-ray spectrometer-powder method of X ray diffraction.

Specific heats of solids: Classical theory, Einstein's and Debye's theory of specific heats. (10 Hrs.)

UNIT II

Free electron Theory: Classical free electron model, expression for electrical and thermal conductivity, Weidman-Franz law, Failure of classical free electron theory.

Semiconductors: Expression for electrical conductivity in case of intrinsic semiconductors, experimental determination of energy gap, Hall Effect, expression for Hall coefficient and applications.

Superconductivity: Introduction, Occurrence of super conductivity, and destruction of super conductivity by magnetic field, Meissner effect, Isotope effect and applications.

Problems

(9 + 1 =10 Hrs.)

UNIT III

NUCLEAR PHYSICS

Alpha –rays: Theory of a decay, Range, Ionization, specific ionization and Geiger-Nuttall relation.

Beta – decay: Continuous beta spectrum, and Neutrino Hypothesis.

Nuclear Models: Liquid drop model- Explanation of semi empirical mass formula, Explanation of nuclear fission on the basis of liquid drop model, Shell model (qualitative) and Magic numbers.

Nuclear Instruments: GM counter, Scintillation counter, Linear accelerator and Cyclotron.

Problems

(12 + 1 = 13 Hrs.)

UNIT IV

ENERGY SOURCES

Introduction, Conventional and nonconventional energy sources, Advantages of Solar energy, Solar radiation at Earth's surface, Solar radiation geometry- altitude angle, Zenith angle, solar azimuthal angle, surface azimuthal angle Solar radiation measurement, Angstrom compensation Pyrheliometer, and Pyranometer.

(10 Hrs.)

UNIT V

DIGITAL ELECTRONICS

Number System-Decimal, Binary, Hexadecimal and their inter conversion Boolean algebra, Truth tables, De Morgan's theorems. Designing of logic gates using NAND and NOR Gates.

SPECIAL MATERIALS

Liquid crystals: Classification, orientational order and inter molecular forces, optical properties, applications in display system

Problems

(6 + 1 = 07 Hrs.)

Physics Lab 6.2: Lab VII

17BSCPHY62

List of experiments

1. Thermistor Energy gap
2. Analysis of X-ray diffraction spectra
3. Hall Effect
4. Attenuation of B-ray using G.M. counter.
5. G.M.Tube (Dead time) / Inverse square law
6. Thevenin's & Norton's theorem using Whetstone's Network
7. Study of DTL gates
8. Use of IC 7400 Basics gates.
9. De.Morgan Theorems.
10. Solar Cell characteristics a) Open Circuit voltage b) short Circuit Current.

Note:

1. Experiments are of our hours duration
2. Minimum of eight experiments to be performed.

Books for Reference:

1. Solid state physics: C Kittel
2. Solid State Physics: A J Dekkar
3. Solid state physics: Kumar & Gupta
4. Solid state Physics: Sexena Gupta Sexena
5. Nuclear Physics: I Kaplan
6. Modern Physics: Murugesan
7. Modern Physics: J.B.Rajam
8. Energy Sources: G.D.Rai
9. Digital Electronics: Malvino & Leach
10. Digital Electronics: B.L.Thereja
11. Computer graphics: Baker & Harn
12. Integrated Circuits: Botkar

**B. Sc. VI Semester
PHYSICS (OPTIONAL)
Paper II**

Physics 6.3: INTEGRAL TRANSFORMS ,OPTOELECTRONICS, COMMUNICATION,
PROGRAMMING and INTEGRATED ELECTRONICS (Total Hours: 50)

**17BSCPHYT63
UNIT -I**

INTEGRAL TRANSFORMS

Fourier transform: Definition, Fourier integral, inverse transform, Fourier transform of derivatives, convolution (Mathematical Statement only), Parseval's theorem (Statement only) , Applications.

Laplace transform: Definition, transform of elementary functions , inverse transforms, transform of derivations, differentiation and integration of transforms, solutions of differential equations. Difference between Laplace and Fourier transform

Problems

(8+2=10 Hrs.)

UNIT – II

OPTOELECTRONICS

Introduction, Light Emitting Diodes, Photo Diodes, Laser Diodes (Pin, Avalanche diodes), Opto-coupler.

Optical fiber: Introduction, Types of Optical fibers (Single mode, Multi mode), Grading, Numerical aperture (derivation), Coherent bundle, Transmission loss, Attenuation and Distortion, Fiber Optical communication system (Block diagram with each block explanation).

Problems

(8+2=10 Hrs.)

UNIT – III

COMMUNICATION

Classification of radio waves, Types of waves, propagation of radio waves through ionosphere (Qualitative), Critical frequency, Critical angle, Virtual height, Secant law.

Modulation and Demodulation: Need for Modulation, Types of modulation, AM modulation, Block diagram of AM Transmitter, Significance of modulation factor, Frequency spectrum of AM and FM., Comparison of FM with AM.

Demodulation: Necessity, AM detection, Square law detector, Block diagram of Super heterodyne receiver.

Problem

(8+2=10 Hrs.)

UNIT – IV

COMPUTER PROGRAMMING

Computer programming Preliminaries, Algorithms, flowcharts and their symbols, simple flow chart examples.

STUDY OF C-LANGUAGE:

Basic structure of C-Programming , tokens, keywords and identifiers , constants, variables, data types, , decision control statement ,operators and expressions , loop control statements ,decision making IF-ELSE statement for looping, case control statements.

Problems

(7+ 3 =10 Hrs.)

UNIT V

ELECTRONICS

Non – Sinusoidal Oscillators – Multivibrators – types of multivibrators, Uses of multivibrators. Explanation of astable, monostable and bistable multivibrators

Integrated Circuits – Timer IC – 555 & 7400 – block diagram and explanation of pin configuration. Uses of timer IC in different cases. Generation of rectangular and square wave using time IC.

Op-Amp – Op-Amp symbol and polarity convention. Ideal op – Amp and practical Op-Amp, Op-Amp as a inverter and non inverter, virtual ground and summing point. Op-Amp applications as phase shift and Wien bridge oscillator

Problems

(8+2 = 10hrs)

PHYSICS 6.4: LAB – VIII

List of Experiments

17BSCPHY64

1. Astable multivibrator using IC – 555 timer (determination of frequency and duty cycle)
2. Phase-shift oscillator using Op-Amp (IC-741) (determination of frequency and phase shift)
3. Wien bridge oscillator using Op-Amp (IC-741) (determination of frequency)
4. Optical fiber – Bending loss and splice loss estimation
5. Study of voltage doubler and tripler using CRO (representation of waveforms)
6. Design, develop and execute a program in C to find and output all the roots of given quadratic equation, for non-zero coefficients.
7. Design, develop and execute a program in C to reverse a given four digit integer number and check whether it is a palindrome or not. Output the given number with suitable message.
8. I-V Characteristics of a thermistor at different temperatures
9. Applications of IC – 7400 (Any three Boolean expressions)
10. Study of divergence of laser beam

Note:

1. Experiments are of Four hours duration
2. Minimum of eight experiments to be performed.

REFERENCE BOOKS:

1. Physics – By Tipler, 5 Edn. W.H. Freeman & Co.
 2. Electronic Devices – By David Bell.
 3. Optoelectronics – By Ajay Ghatak.
 4. Fiber optic communication – By D.C. Agarwal.
 5. Fiber optical communication – By Keiser.
 6. Introduction to Optical Electronics – By J.Wilson & Hawkes PHI.
 7. Electronics Communicatin Systems – By Kennedy & Davis.
 8. Upper Atmosphere – By Kennedy.
 9. Basic Electronics – By B.L.Thereja.
 10. Principles of Electronics – By V.K.Mehta.
 11. Computational Physics – By V.K.Mittal , R.C Verma & S.C.Gupta, Ane Publication.
 12. Programming in ANSI-C (2nd Edition) : E Balagurusamy, Tata McGraw-HillPub. Company New Delhi(1992).
 13. Schaum,s Outline Series : Programming with C (2nd Edition): B.S. Gottfried , Tata Mc Graw – Hill Pub Company, New Delhi(1998).
 14. The 'C' Programming Language (2nd Edition) : Brain W Kernoghan and Dennis M. Righie Prentice- Hall of India Pvt. Ltd. New Delhi(1998).
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2. GEOLOGY

SYLLABI FOR B.Sc. VI SEMESTER GEOLOGY (OPTIONAL)

2019-20
RCU NEW SYLLABUS

S. No.	Paper Code	Title of the Paper	Marks			Exam Time	Inst. Hrs/ week
			Theory/ Practical	Internal	Total		
	B.Sc Semester VI						
3.		HYDROGEOLOGY & ENVIRONMENTAL GEOLOGY	80	20*	100	3 hrs	4
		REMOTE SENSING & ENGINEERING GEOLOGY	80	20*	100	3 hrs	4
4.		PRACTICAL: I. WATER CHEMISTRY PROBLEMS II. MORPHOMETRIC ANALYSIS	40	10**	50	4 hrs	4
		PRACTICAL: I. STUDY OF AERIAL PHOTOS & SATELLITE IMAGES II. ENGINEERING GEOLOGY PROBLEMS III. SURVEYING	40	10**	50	4 hrs	4
* Theory Internal 20 marks covers: Two theory tests (20 marks reduced to 10 marks); **One Practical internal test (20 marks reduced to 10 marks).							

- Student batch:** As this is a semi technical and at present available only at GSS College, each batch should consist of not more than 10 students for the regular practical.
- Study Tour:** There will be a Geological Study Tour to the places of geological interest mainly to study the field occurrence of geological features during each SEMESTER. For the VI Semester, the study tour should be of 10-12 days duration which can be out of state visit. It carries weightage in the final practical marks. Each student shall submit a consolidated study tour report along with the journal.
- Practical Record:** Submission of a well-maintained Journal of the Practical Work done during the semester is necessary before the Practical Examination.
- Assignments:** The students will be given assignments, which are to be submitted along with the journal submission.
- Attendance:** All the students need to attend and maintain 75% minimum.

All this carries 10 marks including viva-voce.

NATURE OF THEORY AND PRACTICAL EXAMINATION

a) Theory Examination: (Total 100 Marks)

i) There will be one theory paper of 80 marks in each semester.

Each paper will contain THREE Sections, which are to be written in the same answer book.

PART A: TWELVE Questions (Definitions/two sentence answers) numbered 1-12, each of 2 marks. Students need to answer ANY TEN questions. (2x10 = 20 Marks)

PART B: SIX Questions (Short answers) numbered as 13,14,15,16,17 & 18. Each of FIVE marks students need to answer ANY FOUR questions (4x5 = 20 Marks)

PART C: FIVE Questions (Descriptive answers) numbered 19,20,21,22 & 23. Each of TEN marks, students need to answer ANY FOUR questions (4x10 = 40 Marks)

ii) The remaining 20 marks are allotted for Internal Assessment Marks – of 1 hour 15 minutes **for two internal tests** in theory.

- a. Two internal tests of 20 marks each reduced to 10 marks.
- b. Internal Assignment/Seminars/Student project work/Viva-voce (10 marks): Students are given assignments/seminars on the subject taught or a student project work.

b) Practical Examination: Total 50 Marks.

- a. Practical examination will have 3 or 4 Questions of **30 marks**.
- b. Practical Record (Journal), Field study tour report and Viva Voce carry **(10 marks)**.
- c. Practical Internal test: One internal test of 20 marks reduced to 10. **(10 marks)**.

B.Sc GEOLOGY (OPTIONAL)
SEMESTER VI

PAPER I – HYDROGEOLOGY & ENVIRONMENTAL GEOLOGY

Max. Marks: 80

Total teaching hours: 70 (5 hrs/week)

UNIT	TOPIC	Hrs
	A. HYDROGEOLOGY	
I	Hydrological Cycle- Evaporation, transpiration, evapotranspiration, precipitation, sublimation, infiltration, runoff, groundwater flow. Water Resources: Surface water and its types. Groundwater and its sources; and sustainable water management.	10
II	Hydrological properties of water bearing materials: Specific yield, specific retention, porosity, permeability, types of openings in rocks. Subsurface distribution of water: Zone of aeration, zone of saturation, groundwater table, perched water table.	10
III	Aquifers: Definition, Classification- Confined and unconfined aquifers, aquiclude, aquifuge, aquitard and Darcy's Law. Seepage: Definition, factors controlling seepage, influent and effluent seepage. Springs: Definition, classification- gravity and non gravity; types of springs- bedding plane, contact, thermal and artesian. Wells and types of wells- dug well, bore well and artesian well.	10
IV	Occurrence of Groundwater in different terrains – weathered, hard and stratified rocks. Water Harvesting: Rainwater harvesting and its importance. Groundwater recharge structures. Water quality parameters – Temperature, pH, conductivity, dissolved oxygen (DO), turbidity.	10
	B. ENVIRONMENTAL GEOLOGY	
V	Definition of ecology and environmental geology, man and environment Hazards: Definition, types of hazards- natural (volcano, earthquake, tsunami, landslide, cyclone and flood) and manmade hazards (soil erosion, coastal erosion). Hazard/disaster management – hazard zoning maps, risk assessment. Pollution- air, water and soil pollution. Greenhouse effect, Global Warming and their effect on the environment.	10

**PRACTICAL
SEMESTER VI**

PAPER I: HYDROGEOLOGY

Max. Marks: 40

Time: 4 hrs/week

Total 50 hrs

HYDROGEOLOGY

1. **Water Quality Interpretation:** Based on given data calculate-Na/RSC/SAR and draw Pie/Bar/Stiff/Gibbs/Piper diagrams and comment on the suitability/quality of the water.
2. Basin Analysis, morphometric analysis using Drainage patterns.
3. Preparation and interpretation of water table maps using the given data.

TEXT BOOKS

1. Groundwater - By Todd D. K., John Wiley and Sons.
2. Groundwater - By K. V. Karanth,
3. Groundwater and Tube wells - By S.P. Garg, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
4. Hydrogeology - By Stanley N. Davis, Roger J. M. De Wiest, John Wiley and Sons.
5. Ground water McGraw Hill. New York. Tolman., G.F. 1937
6. Ground water Hydrology. John wiley & Sons. Todd, D.K. 1959
7. Ground water, Wiley Eastern. Ragunath, H.M. 1983
8. Ground water Resources evaluation, McGraw Hill. Walton, W.C. 1970.
9. Ground water Assessment Development & management Tata McGraw Hill. Karanath, K.R. 1987.
10. Environmental Geology – Indian Context - By K.S.Valdia
11. Geology, Environment and Society – By K S Valdia
12. Coping with natural hazards – Indian Context – By K.S.Valdia
13. Environmental Geology – By Keller
14. Engineering and Environmental Geology - By Árpád Dávid

B.Sc GEOLOGY (OPTIONAL)
SEMESTER VI

PAPER II – REMOTE SENSING & ENGINEERING GEOLOGY

Max. Marks: 80

Total teaching hours: 50 (4 hrs/week)

UNIT	TOPIC	Hrs
	A. REMOTE SENSING	
I	Introduction. Fundamentals of Remote Sensing. Electromagnetic spectrum- Visible & Infrared spectrum Brief history and types of Indian Remote Sensing Satellites. Applications of aerial photographs/satellite imageries in Geoscience & Geomorphological studies.	10
II	Passive and active sensors; Image Resolution- spatial, spectral, radiometric and temporal. Types of Images: Panchromatic image, True Color & False color composite. Thematic images General principles and uses of pocket and mirror stereoscopes.	10
III	Parts of aerial photograph: Fiducial Marks Types of aerial photograph- vertical, inclined/oblique photographs Elements of photo/image interpretation: Photo elements- color, tone, texture, pattern, shape, size, shadow and associated features.	10
IV	Elements of photo/image interpretation: Geotechnical elements- landforms, vegetations, drainage patterns and density, erosional pattern and land use. GPS- General principles and uses. Geographical Information System (GIS)- Introduction, Components, data type (spatial and non spatial) and data structure. Thematic maps and GIS applications.	10
	B. ENGINEERING GEOLOGY	
V	Engineering properties of rocks: crushing strength, porosity, density, abrasive resistance. Geological investigation for construction of dams, tunnels with remedial measures. Building materials - sand, building and dimension stones, aggregates, lime and cement, clays and clay products. Use of Dolerite, Granite, Gneiss, Marble, Slate and Sandstone as decorative stones.	10

**PRACTICAL
SEMESTER VI**

Paper II- REMOTE SENSING & ENGINEERING GEOLOGY

Max. Marks: 40

Time: 4 hrs/week

Total 50 hrs

- A. **REMOTE SENSING:** (Draw neat sketches wherever necessary)
 - i. Depth perception exercises.
 - ii. Interpretation of Aerial photos and satellite images using stereoscopes (tracing and description of a minimum of 5 aerial photos and 5 satellite images).
- B. **ENGINEERING GEOLOGY PROBLEMS** (a minimum of 5 problems in each set)
 - i. Solving of dip and strike problems
 - ii. Solving of Borehole problems (3 point).
 - iii. Identification of suitable site for dam and tunnel construction using the given geological maps.
- C. **SURVEYING**
 - i. Prismatic compass survey – Open traverse, Close traverse and Radial traverse
 - ii. Auto Level/Dumpy Level

TEXT BOOKS

1. Aerial Photographic interpretation and applications- D.R.Leudar
2. Manual of photogrammetry - M.Thomson,Ed
3. Manual of Remote Sensing - R.G.Reeves, Ed
4. Remote Sensing in Geology- P.S.Siegal & A.R.Gillespie
5. Text book of Remote Sensing and Geographical information systems - M.Anji Reddy
6. Photogeology and Regional Mapping - By J. A. E. Allum, Pergamon Press.
7. Principles and Applications of Photogeology - By S. N. Pandey.
8. Photogeology - By Victor C. Miller, Mc Graw Hill Book Co.Inc.
9. Remote Sensing- Principles and Interpretation - By F. F. Sabins,
10. Remote sensing and image interpretation. John Wiley & Sons -T.M and R.W. Kiefer.
11. Photogeology. McGraw-Hill Publishers, New York -Miller, V.C
12. Photogeology and regional mapping- Oxford- Allum, J.A.E (1978).
13. Handbook of aerial photography and interpretation- Rampal, K.K (1999).
14. Remote sensing and its application. Universities Press Ltd., Hyderabad-Narayan, L.R.A (1999).
15. Engineering Geology- Parbin Singh
16. Engineering Geology- F.C.Bell
17. Principles of Engineering Geology - Bangar
18. Surveying – Duggal
19. Surveying & Leveling - Kanetkar

3. CHEMISTRY (OPTIONAL)

SIXTH SEMESTER B.Sc. COURSE

Chemistry

Paper-I

Code : 14BSCCHET61

Teaching Hours : 50 Hours

Inorganic Chemistry:

UNIT-I

Coordination compounds -II

09 hours

Crystal field theory(CFT) with reference to octahedral, distorted octahedral(Jahn-Teller distortion), tetrahedral and square planar complexes, calculation of crystal field stabilization energy, factors affecting $10Dq$, consequences of crystal field splitting on ionic radii of M^{+2} ions, enthalpy of hydration of M^{+2} ions, explanation of colour and magnetic properties of magnetic complexes, limitations of crystal field theory, calculation of magnetic moment using Gouy's method,

UNIT-II

Metal-ligand Equilibria:

05 hours

Stability constant, stepwise and overall formation constants, trends in step wise constants, factors affecting the stability of the metal complexes with reference to the nature of metal ion and ligand.

Chelates - definition, characteristics, factors influencing the stability of metal chelates and importance of chelates.

UNIT-III

Organometallic Chemistry

03 hours

Introduction, classification of organotransition metal complexes, 18 electron rule with respect to $[Fe(CO)_5]$, $[Ni(CO)_5]$, $[Mn(CO)_5]^+$, ferrocene, structure and bonding in metal olefins (Zeise's Salt).

Organic Chemistry:

UNIT-I

Carbohydrates

05 hours

Haworth and conformational formulae of glucose and fructose, mutarotation and its mechanism, osazone formation, Killani's synthesis, Ruff's degradation, epimers and epimerisation with respect to monosaccharides, interconversions of glucose and fructose.

UNIT-II

Vitamins and Hormones

03 hours

Vitamins: Classification and importance of vitamin-A, B₆, B₁₂, C, D and E. Synthesis of Vitamin-C from D(+)-glucose, synthesis of vitamin-A by Vandrop et al.

UNIT-III

Amino acids, Peptides and Proteins

06 hours

Classification, structure and stereochemistry(D and L) of amino acids, acid-base behaviour, iso-electric point and electrophoresis, peptides-nomenclature and structure of peptides, synthesis of a dipeptide(Bergmann synthesis), Classification of proteins, levels of protein structure(primary, secondary and tertiary structure), protein denaturation and renaturation.

UNIT-IV

Terpenoids

03 hours

Introduction, classification of terpenes, Ingold's isoprene rule, constitution of citral with synthesis, synthesis of α and β ionones, synthesis of α -terpeniol.

Physical Chemistry:

UNIT-I

Electronic Spectrum

05 hours

Concept potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules, energy levels and respective transitions, Frank-Condon principle.

UNIT-II

Physical properties and molecular structure

04 hours

Introduction-dipole moment, induced dipole moment, measurement of dipole moment by temperature variation method and its applications.

UNIT-III

Polymers

03 hours

Introduction, classification, determination of molar masses of macromolecules by viscometry and Donnan membrane equilibrium.

UNIT-IV

Quantum Chemistry

04 Hours

Photoelectric effect - Einstein's photoelectric equation, wave particle duality, de-Broglie hypothesis, de-Broglie equation(derivation), experimental verification-Davisson-Germer experiment.

Reference books for inorganic chemistry

- | | |
|--|--------------------|
| 01. Advance Inorganic Chemistry Vol-I and II | Gurudeep Raj |
| 02. Advance Inorganic Chemistry | Satya Prakash |
| 03. Modern Inorganic Chemistry | R.D. Madan |
| 04. Inorganic Chemistry | James Huheey |
| 05. Concise Inorganic Chemistry | J.D. Lee |
| 06. Inorganic Chemistry | Shriver and Atkins |

Books recommended for organic chemistry:

01. Organic Chemistry P.L. Soni
02. Organic Chemistry I.L. Finar Vol-II
03. Biochemistry Voet and Voet

Books recommended for physical chemistry:

01. Molecular Spectroscopy C.N. Banwell
02. Physical Chemistry Atkins
03. Physical Chemistry Puri and Sharma, New edition

SIXTH SEMESTER B.Sc. COURSE

Chemistry

Paper-II

Code : 14BSCCHET62

Teaching Hours : 50 Hours

Inorganic Chemistry:

UNIT-I

Chromatography

07 hours

Principle, types, stationary and mobile phases, physical factors of separation, brief account of paper chromatography, calculation of R_f value, brief account of column chromatography and its applications.

Flame photometry: Principle, Limitations, Instrumentation, Flame photometric determination of Na and K.

Thermogravimetry: Principle and applications of thermogravimetric methods (TG and DTA).

Electrogravimetry: Principle, Instrumentation, Electrogravimetric determination of Copper.

UNIT-II

Soil Analysis

03 hours

Macro nutrients, trace metals and organic matter in soil. Determination of pH, Determination of nitrogen by alkaline permanganate method and phosphorus by Bray's and Olsen's method present in the soil.

UNIT-III

Electronic spectra of transition metal complexes

07 hours

Russel-Sandar's coupling in defining ground states of spectrochemical series, derivation of spectroscopic ground terms(d_1 to d_{10} without J values), types of electronic transitions($d-d$ transitions, charge transfer transitions-MLCT and LMCT), selection rule for $d-d$ transitions, Orgel- energy level diagram- d_1 and d_2 states, discussion of the electronic spectrum of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ complex ion.

Organic Chemistry:

UNIT-I

Chemotherapy

05 hours

Introduction, requirement of an ideal synthetic drug, classification, synthesis and uses of the following-

Antipyretics-antipyrine, paracetamol

Anaesthetics-novacaine(local) and pentothal sodium(general)

Antihistamines-chlorpheniramine maleate(CPM)

Antimalarials-paludrine, chloroquine

Antibiotics-chloromycetin, penicillin, tetracyclin

Para pharmaceutical reagents-Benedict's reagent, sodium citrate, Barfoed reagent

UNIT-II

Soaps and Detergents

03 hours

Soaps - Introduction, manufacture by modern process, cleaning action of soap.

Detergents - anionic, cationic, nonionic, with suitable examples, distinction between soaps and detergents, emulsifiers, stabilisers and builders.

UNIT-III

Reaction Mechanism

04 hours

a) Beckmann rearrangement

b) Favorskii rearrangement

c) Benzidine rearrangement

d) Benzilic acid rearrangement

UNIT-IV

NMR Spectroscopy

05 hours

Principle of Proton Magnetic Resonance(^1H NMR) spectroscopy, nmr spectrum, chemical shift, nuclear shielding and deshielding, spin-spin coupling($n+1$) rule, intensity(height) of the signal, TMS as internal standard-advantages, interpretation of PMR spectra of simple organic molecules such as ethyl bromide, n-propyl bromide, iso propyl bromide, ethanol, acetaldehyde and benzene.

Physical Chemistry:

UNIT-I

Electro motive force

11 hours

Reversible and irreversible cells, EMF of a chemical cell and its measurement by potentiometer, standard cell (Weston standard cell).

Types of electrodes - Reference electrode, calomel electrode, derivation of Nernst equation for emf of a cell, concentration cells- with and without transference, liquid junction potential and its derivation, salt bridge.

Applications of emf measurements-

1) Determination of pH: Using hydrogen electrode, quinhydrone electrode and glass electrode.

2) Potentiometric titrations: Acid-base and redox titration.

UNIT-II

Photochemistry

05 Hours

Photochemical reactions, laws of photochemistry – Beer's law, Lambert's Law, Beer-Lambert's Law, Grothus-Draper Law and Einstein's Law of photochemical equivalence, quantum efficiency or yield, reasons for high and low quantum efficiencies with examples, fluorescence, phosphorescence, photosensitization and chemiluminescence.

Reference books for inorganic chemistry

- | | |
|---|-------------------------|
| 01. Instrumental methods of chemical analysis | Willard martin and Dean |
| 02. Instrumental methods of chemical analysis | H. Kour. |
| 03. Quantitative Inorganic analysis | A.I. Vogel |

Books recommended for organic chemistry:

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|---------------------------------|-----------------|
| 01. Organic Spectroscopy | Y. R. Sharma |
| 02. Organic Spectroscopy | P.S. Kalsi |
| 03. Synthetic Organic Chemistry | Gurdeep Chatwal |

Books recommended for physical chemistry:

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|------------------------|-----------------|
| 01. Quantum Chemistry | Lewin |
| 02. Physical Chemistry | Atkins |
| 03. Physical Chemistry | Puri and Sharma |

CHEMISTRY PRACTICALS

SIXTH SEMESTER B.Sc. COURSE

Chemistry Practical

Paper-I

Code : 14BSCCHEP61

Total number of hours per week: 04

Internal Assessment=10 Marks

Total No. of hours per Semester: 52

Practicals: 40 Marks

A. Organic estimation

01. Estimation of phenol.
02. Estimation of aniline.
03. Estimation of acetamide.

04. Determination and saponification value of groundnut/coconut oil.
05. Determination of Iodine value of groundnut/coconut oil.
06. Estimation of glucose by Benedict's reagent.

B. Physical Chemistry Experiments

01. Determination of concentration of given acids mixture ($\text{HCl} + \text{CH}_3\text{COOH}$) conductometrically using standard NaOH .
02. Verification of Beer-Lambert's Law by colorimetric method and calculation of molar extension coefficient of FeCl_3 .
03. Verification of Beer-Lamberts Law by colorimetric method and calculation of molar extension coefficient of copper sulphate.
04. Determination of concentration of strong acid HCl by potentiometric titration against strong solution of NaOH .
05. Potentiometric titration of FeSO_4 against $\text{K}_2\text{Cr}_2\text{O}_7$.
06. Determination of the solubility and solubility product of sparingly soluble salts (Silver halides) by potentiometrically.
07. Determination of heat of neutralization of strong acid by strong base by water equivalent calorimetric method.
08. Determination of dissociation constant of weak acid (acetic acid) Potentiometrically.

Note: For examination:

50% students will perform organic estimation and 50% students will perform Physical.

CHEMISTRY PRACTICALS
SIXTH SEMESTER B.Sc. COURSE
Chemistry Practical
Paper-II
Code : 14BSCCHEP62

Total number of hours per week: 04
Internal Assessment=10 Marks
Total No. of hours per Semester: 52
Practicals: 40 Marks

**A. Gravimetric experiments: Internal assessment-10 Marks
and Experiment-30 Marks**

01. Estimation of barium as Barium sulphate.
02. Estimation of aluminium as aluminium oxide.
03. Estimation of Iron as ferric oxide.
04. Estimation of lead as lead sulphate.

B. Dissertation/Tour report:

10 marks

The Dissertation/Tour report should be submitted at the time of **Chemistry Practical–VIb**.

Student shall be assigned either dissertation or Tour report. The topics for dissertation shall be selected either from the V and VI semester theory syllabi or general topics related to chemistry. For Tour report, student shall visit an Industry or Academic/Research institutions like BARC, IISc etc.

Note: For examination:

Gravimetric experiments and Dissertation/Tour report are Compulsory.

4. ELECTRONICS (OPTIONAL)

w.e.f 2019-20 and onwards

ELECTRONICS (Optional)

B. Sc. SEMESTER –VI

PAPER – I

Total Teaching hours: 50, Teaching hours per week: 4 hours

ELE- 6.1: DIGITAL COMMUNICATION, SATELLITE COMMUNICATION & TELEVISION

UNIT - I: PULSE AND DIGITAL COMMUNICATION:

Introduction – sampling theorem, types- PAM, PWM, PPM, PCM – quantization. Digital communication systems – introduction, Digital modulations (FSK, PSK, and ASK). Advantage and disadvantages of digital transmission, Applications. Characteristics of data transmission circuits – Shannon limit for information capacity, Bandwidth requirements, Data transmission speed, Noise, Cross talk, Echo Suppressors, Distortion and Equalizer.

8Hrs.+2Hrs.Problems =10hrs

UNIT II: SATELLITE COMMUNICATION

Introduction, satellite orbits, Satellite system -Block diagram of satellite sub systems, up link, down link, cross link, C-band transponders, Space segment, and ground station (simplified Block diagram of earth station). Multiple access methods -TDMA, FDMA, CDMA, GPS-service's like SPS & PPS. Mobile communication (qualitative), Cellular Concept, Base station.

8Hrs.+2Hrs.Problems =10hrs

UNIT III: TELEVISION

Television receiver circuit: Monochrome TV Block diagram Each block explanation. Gross structure, Image continuity, Horizontal and vertical scanning, Number of scanning lines, Flicker, Interlaced scanning, Fine structure, Composite video signal(Detail study), Blanking pulses, Horizontal

and vertical synchronization, Equalizing pulses, Channel bandwidth, vestigial side band transmission. T.V. Signal standards.

8Hrs.+2Hrs.Problems =10hrs

UNIT - IV: COLOUR TELEVISION

Essentials of colour T.V. (compatibility, natural light, three colour theory-grassman law), Luminance, Hue and Saturation, Chromaticity diagram, Luminance signal(Y), Production of colour difference voltage, Delta gun colour picture tube, Detail description of each block of colour television.

8Hrs. +2Hrs.Problems =10hrs

UNIT - V: POWER ELECTRONICS

SCR, DIAC and TRIAC (construction, working and their characteristics).

Applications: SCR as a half wave rectifier and power control device DIAC as a lamp dimmer and TRIAC as an electronic switch.

UJT (construction, working and characteristics) UJT as a relaxation oscillator (expression for frequency of oscillation).

8Hrs. +2Hrs.Problems =10hrs

REFERENCE BOOKS:-

1. Electronic Communication, George Kennedy, 3rd edition, TMH.
2. Electronic Communication, Roddy and Coolen, 4th edition, PHI.
3. Electronic Communications Systems, Wayne Thomasi, 5th edition.
4. Digital Communication System : Ronald J Tocci.
5. Monochrome and Colour television, R.R.Gulati, New Age International.
6. Colour TV Principle & Practice, R.R.Gulati, New Age international.
7. Basic Television Principle & Servicing, Bernard Grob, McGraw Hill.
8. Television and Video Engg., A.M.Dhake, Tata McGraw Hill Publishing
9. Principles of Electronics By V K Mehta
10. Communication By Gupta and Kumar.

LIST OF EXPERIMENTS

Lab.-6.1:

Each experiment is of four hours duration. Minimum EIGHT experiments are to be performed.

1. ASK modulation and demodulator
2. FSK modulation
3. PWM and PPM
4. PAM modulator and demodulator
5. Three way Audio cross over network.
6. PLL using IC565
7. Frequency mixer
8. Time Division Multiplexing and de multiplexing
9. Frequency Multiplier
10. SCR characteristics.
11. SCR as a half wave rectifier
12. UJT Characteristics
13. UJT as a relaxation oscillator

B. Sc. SEMESTER –VI

PAPER – II

Total Teaching hours: 50,

Teaching hours per week: 4 hours

ELE- 6.2: COMPUTER CONCEPTS AND C-PROGRAMMING:

UNIT - I: COMPUTER CONCEPTS

Introduction to computer system logic organization, block diagram of computer system, central processing unit (CPU), ALU, CU, main memory , input, output unit brief introduction of history of computer generations.

Hardware: Input devices (Keyboard,mouseand scanner).

Output devices (various types of printers). Secondary storage devices (CD-ROM, optical disk).

Software: System software, operating system application software, MLL, ALL and HLL. Assemblers, compilers and editors. Algorithm,Characteristics of an algorithmand flow charts.

8Hrs.+2Hrs.Problems =10hrs

UNIT - II: INTRODUCTION TO C-PROGRAMMING:

Importance of C, Basic Structure of C programming style. Execution of C program, C tokens, key words and identifiers Constants. Variables and data types, declaration of variables, assigning values to variables, defining symbolic constants. Operators and expressions (All type)

8Hrs.+2Hrs.Problems =10hrs

UNIT -III: DECISION MAKING, BRANCHING

Decision making, Branching and looping:Decision making with IF statement, IF ELSE statement. Nested IF, Switch statement the “?” operator, the GOTO, WHILE, DO and FOR statements.

8Hrs.+2Hrs.Problems =10hrs

UNIT -IV: ARRAY AND STRING HANDLING PROGRAMS:

One and two dimensional arrays, initializing of arrays, multidimensional arrays.

String: Declaring and initializing string variables, reading and writing of strings, String handling functions.

8Hrs.+2Hrs.Problems =10hrs

UNIT -V: FUNCTIONS AND POINTERS

Modularization & advantages, Function definition, arguments and parameters,

local and global variable, function declaration. Parameter passing mechanism:

Call by value & call by reference.

Pointers: Definition, advantages, pointer declaration, operations on pointers, pointer initialization.

8Hrs.+2Hrs.Problems =10hrs

REFERENCE BOOKS:-

1. Theory and Problems of programming with C - Schaum's series -Byron Gottfried, McGraw Hill International Book Co.,
2. Programming in ANSI C - E.Balagurusamy, Tata McGraw Hill
3. Programming with C - K.R.Venugopal and R.P. Sudep, Tata McGraw Hill
4. The C Programming Language - Kernighan and Ritchie
5. Mastering Turbo C - Stan Kelley, Bootle, BPB Publications
6. Let us C - Yashwant Kanetkar
7. Computer fundamentals– Rajaraman
8. Numerical Algorithms - Krishnamurthy and Sen
9. Computer concept and C programming By P B Kotur

LIST OF EXPERIMENTS

Lab.-6.2:

Each experiment is of four hours duration. Minimum EIGHT experiments are to be performed in the semester course

1. Write a C program To Find the Roots of quadratic equation
2. Write a C program To Find the Factorial of the given number.
3. Write a C program To Find the largest of three numbers.
4. Write a C program To find the leap year.
5. Write a C program to generate first N Fibonacci numbers and print the result.
6. 6. Write a C program to find the sum of the first N natural numbers and print the result.
7. Write a C program to read two matrices and perform addition and subtraction.
8. Write a C program to perform multiplication of two matrices.
9. Write a C program to find whether the given number is prime number or not.
10. Write a C program to find the area of a triangle.
11. Write a C program to find to compute the sum of even numbers and odd numbers using function.

7. Write a C program to read two matrices and perform addition and subtraction.
8. Write a C program to perform multiplication of two matrices.
9. Write a C program to find whether the given number is prime number or not.
10. Write a C program to find the area of a triangle.
11. Write a C program to find to compute the sum of even numbers and odd numbers using function.

5. GEOGRAPHY (OPTIONAL)

COURSE STRUCTURE (SCHEME) UNDER CBSE SYSTEM

Theory and Practical Paper- VI SEMESTER

VI	Theory Paper - VII-Compulsory					
	Human Geography	05	80	20	100	3 hours
	Practical Paper - VII					
	Map Projections	04	40	10*	50	4 hours
	Theory Paper – VIII-Optional (select any one)					
	VIII- A. Environmental Geography VIII- B. Regional Planning	05	80	20	100	3 hours
	Practical Paper – VIII					
	Field Work and Dissertation	04	40	10*	50	4 hours

B. A. /B. Sc. SYLLABUS IN GEOGRAPHY

SEMESTER – VI

THEORY PAPER-VII (Compulsory)

HUMAN GEOGRAPHY

Objectives: To understand the nature of man- environment relationship and human capability to adopt and modify the environment under its varied conditions from primitive life style to the modern living; to identify and understand environment and population in terms of their quality and spatial distribution pattern and to comprehend the contemporary issues facing the global community.

Course structure : One Theory and One Practical

Teaching Theory : 05 hours per week

Practical : 04 hours per week.

Examination : One Theory paper of 80 Marks and 20 Marks for internal assessment (IA)

One Practical of 40 Marks and 10 Marks for internal assessment (IA) (out of 10 IA marks 7 marks for practical record and journal and 3 marks for attendance).

Units No.	Topic	Teaching Hours
I	Nature, Scope and Significance of Human Geography, Relationship between Man and Environment. Recent Trends and Different approaches in Human Geography,	12
II	Broad Racial groups of the world, classification of races, main characteristics and distribution pattern of major races of world.	10
III	Impact of environment on the mode of life on Primitive population groups of the World, Pygmies, Bushman, Sakais, Semongs, Eskimos and Kirghies.	16
IV	Indian tribal groups: Mode of life of Todas, Gonds, Santals, Bhills and Nagas.	10
V	Population: Growth and Distributional pattern of Density, Factors influencing the distribution of population, Components of fertility, Mortality and Mobility. Migration: meaning and types of migration.	12
	Total	60 hours

Reference:

1. Alexander - Economic Geography
2. Majid Hussain- Human Geography
3. Peter Haggett- Locational Analysis in Human Geography
4. Davis K. - Man & Earth
5. Ranganth and P. Mallappa- Human Geography (Kannada)
6. P.Mallappa.- Human Geography (Kannada)
7. M.B.Goudar.- Human Geography(Kannada)
8. S.S.Nanjannvar - Human Geography (Kannada)

B. A. /B. Sc. SYLLABUS IN GEOGRAPHY**SEMESTER – VI****PRACTICAL PAPER - VI****MAP PROJECTIONS**

Units No.	Topic	Teaching Hours
I	Map Projection : Introduction , meaning, classification and importance	08
II	Zenithal Projections : Graphical construction, properties of Following projections a. Polar Zenithal Gnomonic projection b. Polar Zenithal Stereographic projection c. Polar Zenithal Orthographic project	10
III	Conical Projections: Graphical construction, properties of following projections a. Conical projection with one standard parallel b. Conical projection with two standard parallel c. Bonne's projection	10
IV	Cylindrical Projections: Graphical construction, properties of following projections	12

	a. Simple cylindrical projection b. Cylindrical Equal area projections and c. Mercator's projection	
V	Viva	
	Total	40 hours

Reference:

1. R. L. Singh: Elements of Practical Geography
2. Gopal Singh: Practical Geography
3. Dr. Ranganat: Practical Geography (Kannada Version)
4. Singh and Kanoj: Practical Geography
5. R. P. Misra and Ramesh: Fundamental of Cartography
6. M. F. Karennavar & S. S. Nanjannavar: Practical Geography.
7. M .F. Karennavar & S. S. Nanjannavar: Practical Geography (Kannada Version)
9. Pijushkanti Saha & Partha Basu: Advanced Practical Geography

B. A. /B. Sc. SYLLABUS IN GEOGRAPHY

SEMESTER – VI

THEORY PAPER-VIII

(OPTIONAL)

PAPER VIII – A : ENVIRONMENTAL GEOGRAPHY

Objectives: The basic objective of this course is to apprise the students with the interrelationship between Man and his environment within which he lives and his linkages with other organisms. The course further aims to give broad perspective ideas of environment, ecology and ecosystem. The information and their interaction between living organisms with physical and cultural environment. The importance of conserving bio-diversity to maintain ecological balance has also been emphasized in this course.

Sl No	Unit	Topic to be Covered	No of Hours
1	1	Definition, Scope and Content of Environmental Geography. The Components of Environment. Ecosystem: Structure, Functions and	10

		Energy flow in the Ecosystem.	
2	2	Biodiversity: Types of Biodiversity, Uses of Biodiversity, Biodiversity at the local, regional and global level. Conservation: Levels of Destruction of Biodiversity,	14
3	3	Causes of Threats to biodiversity. Endangered and Endemic species of India. Environmental Pollution: Types of Pollution, Causes and Efforts of Pollution. Global Warming, Depletion of Ozone Layer.	16
4	4	Controlling Measures of Different Types of Pollution. Controlling Urban and Industrial Wastes, Management of Disaster Control. Man and Environment:	10
5	5	Interdependence between Man and Environment. Mans influence on Vegetation, Biotic Life, Climate, Soil and Water. Population and Environment; Population Explosion and Environment, Quality Environment and Human Health.	10

REFERENCE:

1. R.B. Singh(1990) Environmental Geography, Heritage Publishers New Delhi
2. Strahler. A.N. The Earth Sciences, Haper International Education. New york.
3. Strahler A.N.& Strahler.A.H, Geography of man's Environment, John wiley & sons
4. Savinder Singh, Environmental Geography, Prayag Pustak Bhawan,1997
5. Kates,BI &White.GF, The Environment as Hazards, Oxford, New York
6. R.B.Singh(Ed) Disaster Management, Rawat Publication, New Delhi,
7. Saxena.H.M (2000) Environmental Geography, Rawat publication, New Delhi
8. H.K.Gupta(Ed) Disaster Management, University Press, India, 2003
9. Gold Smith Edward The Earth Report- The essential Guide to Global Issues, Price stern solan Inc californa.USA (et.al)

B. A. /B. Sc. SYLLABUS IN GEOGRAPHY

SEMESTER – VI

THEORY PAPER-VIII

(OPTIONAL)

PAPER VIII – B : REGIONAL PLANNING

Objectives: To understand and evaluate the concept of region in geography and its role and relevance in regional planning, to identify the issues relating to the development of the region through the process of spatial organization of various attributes and their interrelationships. The course also aims to identify the causes of regional disparities and to suggest the measures for the development of the region.

Course structure : One Theory and One Practical

Teaching Theory : 05 hours per week

Practical : 04 hours per week.

Examination : One Theory paper of 80 Marks and 20 Marks for internal assessment (IA)

One Practical of 40 Marks and 10 Marks for internal assessment (IA) (out of 10 IA marks 7 marks for practical record and journal and 3 marks for attendance).

Units	Topic	Teaching Hours
I	Concept of Region- types and hierarchy of regions - concept of planning- types of planning - approaches to Regional planning. Indicators of development.	10
II	Basic issues in Regional planning-Gross root level and systems of regional planning, Regional interactions and socio-economic and technological development.	12
III	Development strategy of planning: Need of planning for natural, social and economically background regions. Tribal area development planning.	10
IV	Regional Planning Processes – sectoral, temporal, spatial and multi level planning. Centralized and Decentralized planning; Block and District level planning and Integrated Area Development Planning (IADP).	12
V	Role of urban centers in regional development. City regions and their problems. Regional Disparities. Planning Regions in Karnataka; Policies and Programmes for backward area development.	16
	Total	60 hours

REFERENCES:

1. Ashish Sarakar(2011) : Regional planning in India.
2. Bhat L. S. : Aspects of Regional Planning in India
3. Chandana. R. C. (2003) : Regional Planning A Comprehensive Text
4. Chaudhuri. J. R.(2009) : An Introduction to Development and Regional Planning with special reference to India.
5. Dickinson R.E.(1964) : City and Region ; A Geographical Interpretation. Routledge and Keagan Paul.
6. Galasson John (1974) : An Introduction to Regional Planning Hutchinson. Educational London
7. Misra R.P.Sundaram k.v.
&V.L.S.Prakasa Rao(1974) : Regional Development Planning In India.

8. Misra R.P. (1992) : Regional planning, Concept Publishing company. New Delhi.
9. M. Chand & V. Puri (1983) : Regional Planning in India, Allied publishers Ltd., New Delhi.
10. Sundaram, K. V. (1985) : Geography and Planning", Concept Publishing Company, New Delhi

B. A. /B. Sc. SYLLABUS IN GEOGRAPHY

SEMESTER – VI

PRACTICAL PAPER - VIII

FIELD WORK AND DISSERTATION

Units No.	Topic	Teaching Hours
I	Preliminary Discussion and selection of the topic. Preparation of Questionnaire.	08
II	Data collection, Tabulation, and Methodology.	20
III	Final report writing.	12
IV	Viva-Voce	
V		
	Total	40 hours

Reference:

1. R. L. Singh: Elements of Practical Geography
2. Gopal Singh: Practical Geography
3. Dr. Ranganat: Practical Geography (Kannada Version)
4. Singh and Kanoj: Practical Geography
5. R. P. Misra and Ramesh: Fundamental of Cartography
6. M. F. Karennavar & S. S. Nanjannavar: Practical Geography.
7. M .F. Karennavar & S. S. Nanjannavar: Practical Geography (Kannada Version)
9. Pijushkanti Saha & Partha Basu: Advanced Practical Geography

6. BIOTECHNOLOGY (Optional)

VI Semester BIOTECHNOLOGY (Optional) B.Sc Biotechnology (Optional Subjects) Semester System Syllabus

Semester	Title of the paper	Number of hours/week/paper	Duration of Examination	Internal Assessment Marks- 20/10				Semester end Examination Marks
				I Test	II Test	SEM - Assignment	ATTENDANCE	
I	Cell biology and Genetics	04 Hours	03 Hours	04	10	03	03	80 Marks
	Lab	04 Hours	04 Hours	10 Marks				40 Marks
II	Biochemistry & Biostatistics	04 Hours	03 Hours	04	10	03	03	80 Marks
	LAB	04 Hours	04 Hours	10 Marks				40 Marks
III	Microbiology and Immunology	04 Hours	03 Hours	04	10	03	03	80 Marks
	Lab	04 Hours	04 Hours	10 Marks				40 Marks
IV	Molecular Biology & Bioinformatics	04 Hours	03 Hours	04	10	03	03	80 Marks
	Lab	04 Hours	04 Hours	10 Marks				40 Marks
V Paper I	Plant and animal Biotechnology	04 Hours	03 Hours	04	10	03	03	80 Marks
	Lab	04 Hours	04 Hours	10 Marks				40 Marks
V paper II	Genetic Engineering & NanoTechnology	04 Hours	03 Hours	04	10	03	03	80 Marks
	Lab	04 Hours	04 Hours	10 Marks				40 Marks
VI Paper I	Industrial, & Environmental Biotechnology	04 Hours	03 Hours	04	10	03	03	80 Marks
	Lab	04 Hours	04 Hours	10 Marks				40 Marks
VI Paper II	Agricultural & Medical biotechnology	04 Hours	03 Hours	04	10	03	03	80 Marks
	Lab	04 Hours	04 Hours	10 Marks				40 Marks

SEMESTER-VI

with effect from
Academic Year 2019-20 and onwards.
SUBJECT: BIOTECHNOLOGY (OPTIONAL)

PAPER 6.1: INDUSTRIAL AND ENVIRONMENTAL BIOTECHNOLOGY

Total hour allotted – 50 Hrs.

PART A: INDUSTRIAL BIOTECHNOLOGY

1. Introduction to industrial biotechnology, Basic principle of fermentation technology.	2 Hrs
2. Design of fermentor and types: Introduction, aseptic operation of fermenter, control and measurement Equipment & fermentor, pH, impeller, sparger, batch, aeration, Agitation, temperature control & foam control, types of fermentors – typical, airlift, Bubble up fermentor .	5 Hrs
3. Screening & isolation of industrially important microorganisms	2 Hrs
4. Downstream process: Introduction, removal of microbial & other solid matter, Foam separation, filtration, centrifugation and application	3 Hrs
5. Fermentation media: Natural and synthetic media, Sterilization techniques- Heat, Radiation, and filtration methods.	2 Hrs
6. Production of microbial products: Lactic acid, Alcohol, penicillin & amylase.	3 Hrs
7. Fermented foods: Fermented foods-Yoghurt, Buttermilk, Dosa, cheese, Tempeh Microbial foods-Single cell protein (SCP) and single cell oils (SCO).	3 Hrs
8. Plant cell suspension culture for the production of food additives: Saffron and capsaicin and shikonin.	2 Hrs
09. Microbial polysaccharides and polyesters; production of xanthan gum and Polyhydroxy alkanoids (PHA).	3 Hrs

PART B: ENVIRONMENTAL BIOTECHNOLOGY

1. Renewable and non-renewable resources of energy.	2 Hrs
2. Impact of conventional and non conventional fuels on environment.	4 Hrs
3. Biodegradation (xenobiotic compounds –simple, aromatic and petroleum products) and bioremediation.	4 Hrs
4. Solid waste management: Biogas production and its advantage.	2 Hrs
5. Microbial ore leaching and recovery: Biomining.	2 Hrs
6. Treatment of municipal waste and industrial effluents.	2 Hrs
7. Study of Vermicomposting.	2 Hrs
8. Study of Air, water and Soil pollution.	3 Hrs
9. Environmental protection Act and related issues.	2 Hrs
10. Concept of global warming, ozone depletion (green house effect, acid rain & Ecofarming)	2 Hrs

PAPER 6.2-PRACTICAL INDUSTRIAL AND ENVIRONMENTAL BIOTECHNOLOGY

1. Identification of industrially important microorganisms; *E.coli*, *Saccharomyces Cereviceae*, *Spirulina*.
2. Algal and Fungal culture – *Spirulina*, *Agaricus*, *Yeast* and *Aspergillus*.
3. Study of sugar fermentation by microorganisms by acid and gas production.
4. Preparation of wine from Grape, Banana / sweet potato.
5. Study of Bio gas plant.
6. Production of Biofertilizers, Vermi composting.
7. Estimation of Lactic acid.
8. Estimation of Lactose.
9. Bacteriological examination of water by MPN method.
10. Analysis of water samples for BOD, O₂, toxic chemicals and microbial flora.
11. Determination of quality of water by MPN test.
12. Estimation of solids in sewage.
13. Visit to research centers / institutions / Industries.

NOTE: A report on the visit should be written and submitted along with Practical record.

References: Industrial microbiology:

1. Caside, LE 1968: Industrial microbiology, Wiley Eastern Ltd., New Delhi
2. Dubey, A.R.C.1995: A text book of Biotechnology.
3. Glazer A.N and Nikaido H-1995: Microbiology Biotechnology W.H.Freeman and co.
4. Harrison, Maureen.A, Ral, Ian F 1997: General Techniques of cell culture, Cambridge University Press.
5. Jay James M – 1996: Modern food microbiology CBS Publishers, New Delhi
6. Mallik. V.S and Sridhar P 1992 : Industrial microbiology
7. Patel A H. 1984: Industrial Biotechnology
8. Prakash M and Arora C.K.1998: Cell and Tissue Culture, New Delhi.
9. Prescott S.C and Dunn C 1984: Industrial microbiology, McGraw Hill, New York
10. Purohit S.S., Mathur .S.K.1996 : Biotechnology-fundamentals and applications. Agrobotanical Publishers, New Delhi
11. Singh B D.2000: Biotechnology, kalyani publishers, Ludhiana.
12. Spier, R.E.and Griffith J.B.1987: Modern approaches to animal cell technology, Somerset, Butterworth and company ltd.
13. Stanbury P.F., Whitaker H . 1997: Principle of fermentation technology, Aditya book limited.
14. Sullia S.B and Shantaram S. 1998: General Microbiology, Oxford and IBM publishing Co.
15. Singh B D.2006: Biotechnology, kalyani publishers, Ludhiana.
16. wulfer Cruger and Annelier: Biotechnology. A text book of Industrial Microbiology. Cruger- Panima Publishing corporation, New Delhi

Environmental Biotechnology:

1. A.K.D.E.: Environmental Chemistry, Wiley Eastern Ltd., New Delhi.
2. Agarwal K.C.1996: Biodiversity. Agro-botanical publishers, New Delhi.
3. Alexander N.Glazer, Hiroshi Nikaida, 1995 Microbial biotechnology, Freeman and co.
4. Allosopp D and Seal K.J.: introduction to biodeteriation, EL 85/Edward Arnold
Baker. K.H. and Herson D.S.1994: Bioremediation McGraw Hill Inc., New York
5. Chatterji A.K 2002, introduction to environmental biotechnology, Prentice Hall of India.
6. Christon J, Harst 1997, Manual of Environmental Microbiology, ASM Press,Washington DC
7. D.P.Singh and S.K.Dwivedi, Environmental Microbiology and Biotechnology, New age
International Publishers
8. Dicastri F and Younes T, 1996, Biodiversity Science and development CAB
International, Walfinhfords UK
9. Foster C.F. John WAe D.A Environmental Biotechnology, Ellis Horword Limited.
- 10.Grabiell Baston 1994: Waste Water Microbiology, willey-Liss inc., New York.
11. Lehinger T et.al Microbiology Degradation of Xenobiotics and Recalcitrant
compounds, Academic Press, New York.
12. Metcalt and Eddy Inc., Waste Water Engineering- Treatment disposal and
Reuse, Tata McGraw Hill, Delhi.
13. Mitchell R.Water Pollution Microbiology Vol I and II , Wiley inter science, NewYork.
- 14.Sinha R.K. 1997: Global Biodiversity, INA, Shree Publishers, Jaipur.

PAPER 6.3 AGRICULTURAL AND MEDICAL BIOTECHNOLOGY

Total hours allotted: 50

PART A - AGRICULTURAL BIOTECHNOLOGY

1. Introduction to agricultural biotechnology. (02hrs)
2. Crop improvement, hybridization and plant breeding techniques (04hrs)
3. Plant tissue culture application in agriculture, horticulture and cryopreservation (04hrs)
4. Study of biopesticides used in agriculture (Neem as example), Integrated Pest Management (03hrs)
5. Mechanism of biological nitrogen fixation process, study of nif, nod and hup genes in Biological nitrogen fixation (03hrs)
6. **Biofertilizers:** Mechanism of growth promotion by microbial inoculants- *Rhizobium*, *Bradyrhizobium*, *Azospirillum*, *Azotobacter* and *Mycorrhizae*. (05 hrs)
7. Use of plant growth regulators in Agriculture and Horticulture. (02hrs)
8. **Transgenic plants:** Technique and application (Bt. Cotton and Golden Rice) (02Hrs)

PART B- MEDICAL BIOTECHNOLOGY

1. Introduction and scope of medical biotechnology. (02Hrs)
2. **Vaccines:** (02Hrs)
Production of Bacterial and Viral vaccines, recombinant vaccines and its Production (FMDV) and gene vaccines.
3. **Enzymes used in Diagnosis:** Immobilized enzymes. (02Hrs)
4. **Enzymes in Therapy:** (02Hrs)
Important enzymes and their therapeutic applications.
5. Insulin production by recombinant DNA technology. (02Hrs)
6. **Therapeutic proteins:** (04Hrs)
Important proteins and their therapeutic applications- Somatotropin, Cytokines, Interleukin, Interferon, Human Factor-VIII and IX.
7. **Hybridoma Technology** (04Hrs)
Production of monoclonal antibodies and their applications.
8. **Human Gene Therapy** (05Hrs)
Somatic and Germline therapy. In vivo and in vitro gene therapy with an example each, scope of Human Gene Therapy.
9. **Antisense Technology:** Principles and applications. (02Hrs)

PRACTICAL 6.4 AGRICULTURAL AND MEDICAL BIOTECHNOLOGY

1. Isolation of soil microorganisms – *rhizobium*, *azotobacter* and *mycorrhiza*
2. Estimation of Soil alkalinity
3. Estimation of soil organic matter
4. Effect of bio-pesticides on the growth of microorganisms.
5. Isolation of rhizobium from root nodules.
6. Study of R:S ratio (Rhizosphere : Non rhizosphere samples)
7. Culturing microorganisms from vermi compost.
8. Seed inoculation with rhizobium culture and observation for root nodulation.
9. Photographic demonstration of transgenic crop plants / animals and agricultural biotechnology innovations.
10. Preparation of biocontrol formulation.
11. Biofertilizer Formulations
12. Culturing of antibiotic resistant strains of bacteria and verification of resistance.
13. Demonstration of PCR for diagnosis of a disease.
14. Study of life cycle of Honeybee and Silkworm.

References:

1. Chatwal G.R.1995: Text Book of Biotechnology, Anmol Pub. Pvt.Ltd.
2. Chrispeel M.J. and Sdava D.E.1994, Plant Genes and Agriculture, Jones and Barlett Publishers, Boston.
3. Cruger W and Cruger A.: Biotechnology- A texr book of Industrial Microbiology, 2nd edn.
4. Gamborg and Phillips 1996: Plant Cell, tissue and organ culture: Fundamental methods, Narosa Pub.
5. Gupta .P.K.1996: Elements of Biotechnology, Rasotagi and company.
6. Ignacimuthu S. 1996: Applied Plant Biotechnology.
7. Natesh S, Chopra. V.L and Ramachandra S. 1994: Biotechnology in Agriculture, Oxford and IBM Publ Co. Pvt. Ltd., New Delhi.
8. Prakash M and Arora C.K.1998: Cell and Tissue Culture, New Delhi
9. Razdan M.K.1993: An introduction to Plant Biotechnology.
10. Singh B D.2006: Biotechnology, kalyani publishers, Ludhiana.
11. Plant Biotechnology & Molecular Markers (2004) Shrivastava *et al*
12. Agricultural Biotechnology (1998) Altman, A.
13. Plant Biotechnology: The Genetic Manipulation of Plant (2004) Adrianstater *et* Legal Aspect of Gene Technology (2004) Brian, C.
14. The GMO Hand Book: Genetically Modified Animals, Microbes & Plant (2004) Sarad, R

7. MATHEMATICS (OPTIONAL)

SYLLABUS FOR B.SC MATHEMATICS (OPTIONAL)
SIXTH SEMESTER (2016-17 onwards)
PAPER I
DIFFERENTIAL EQUATIONS

TEACHING HOURS: 50 HRS

TEACHING: 5 HRS PER WEEK

Unit I.

Differential Equations : Simultaneous differential equations with two and three variables, Total differential equation, Condition of Integrability and its solutions.

(10 hrs)

Unit II.

Series Solutions of Ordinary Differential Equations: Basic definitions, Power series, ordinary and singular points, Power series solutions of ODEs. Frobenius method.

(10hrs)

Unit III.

Legendre equation and functions: Solutions of Legendre's equations in series,

Legendre's functions- first and second kind, Rodrigue's formula, Orthogonal properties. Legendre's polynomial, recurrence formulae

(10hrs)

Unit IV.

Partial differential equations of 1st order: formation of partial differential equation by eliminating arbitrary constants and functions. Lagrange's linear partial differential equation $Pp+Qq = R$ and its solution. Non-linear differential equations of standard forms I,II,III and IV

(10 hrs)

Unit V.

a) Non-linear partial differential equations: Charpit's method.

b) Linear partial differential equations with constant coefficients **(10 hrs)**

REFERENCES:

- 1) Differential equations – D.A.Murray
- 2) Differential equations – Bhudev Sharma
- 3) Differential equations – J.N.Sharma and R.K.Gupta (Krishna Prakashan Mandir Meerut)
- 4) Text book of Mathematics – G.K.Ranganath
- 5) Higher Engineering Mathematics by B. S.Grewal

PAPER II

COMPLEX ANALYSIS AND RING THEORY

TEACHING HOURS: 50 HRS

(TEACHING: 5 HRS PER WEEK)

Unit I.

Complex Analysis : Analytic function. Cauchy-Riemann equations, Harmonic function, Harmonic conjugate. Construction of analytic function using Milne-Thomson's method. (10 hrs)

Unit II.

Complex Integration : Cauchy's Theorem , Morera's Theorem , Cauchy's Integral formula, Cauchy's Integral formula for derivatives, Cauchy's inequality , Liouville's Theorem . (10 hrs)

Unit III.

Taylor's and Laurent's series, zeros and singularities of analytic functions. Calculus of Residues (10 hrs)

Unit IV.

Residue Theorem, Jordan's lemma and Contour Integration. (10 hrs)

Unit V.

Rings and Integral domains: Rings, Properties of rings, sub rings, ideals, principle and maximal ideals in a commutative ring, quotient rings, homomorphism and isomorphism, and integral domains (10 hrs)

REFERENCES :

- 1) Theory of functions of a Complex variables- Shanti Narayan and Mittal.
- 2) Complex Variables – B.S Tyagi
- 3) Complex Variables – J.N Sharma
- 4) Modern Algebra by A.R.Vasistha
- 5) Rings and Modules by C.S.Musli
- 6) A Text book of B.Sc. Mathematics by Dr. S.S. Bhusanoormath and others

PAPER III

TOPOLOGY AND LAPLACE TRANSFORMS

TEACHING HOURS: 50 HRS

TEACHING: 5 HRS PER WEEK

Unit I.

Topology-: Open set, closed set, closure of a set, neighborhood, limit points and derived sets, interior, exterior and boundary points of a set. **(10hrs)**

Unit II.

Topology-(contd...): Base & sub-base, subspace, separation axioms. T_1 & T_2 spaces (properties and examples). **(10hrs)**

Unit III.

Laplace transforms-: Definition, basic properties. Laplace transforms of some common functions. First shifting theorem, change of scale property. **(10 hrs)**

Unit IV.

Laplace transforms--(contd..): Laplace transforms of periodic functions, Laplace transforms of derivatives and integrals, inverse Laplace transforms **(10 hrs)**

Unit V.

Laplace transforms--(contd...) Heaviside function, Dirac-delta function, unit step function, convolution theorem and Laplace transforms method of solving differential equation of first and second order with constant coefficients **(10 hrs)**

REFERENCES:

- 1) Modern algebra and Topology- E.Sampathkumar and K.S.Amur
- 2) Topology – J.N.Sharma (Krishna Prakashan Meerut)
- 3) Topology by R.S.Agrawal
- 4) Laplace Transform Theory – M.G.Smith
- 5) A Text Book Of Mathematics– G.K.Raganath

Pattern of question paper for B.Sc. V & VI Semesters effective from 2016-17

PART A:

Q 1 with **TWELVE** sub Questions numbered as **a,b,c,d,e,f,g,h,i,j,k,l** each of TWO marks should be set. Student has to answer any **TEN** questions.

Note:

1. At least TWO questions should be set on each unit.
2. Total Marks: $2 \times 10 = 20$ marks

PART B :

SIX Questions numbered as **2, 3, 4, 5, 6, 7** each of FIVE marks should be set. Student has to answer any **FOUR** questions.

Note:

1. Total marks: $5 \times 4 = 20$ marks
2. At least ONE question should set on each unit.

PART C:

FIVE Questions numbered as **8, 9, 10, 11, 12**, each of TEN marks should be set. Student has to answer any **FOUR** questions.

Note:

1. ONE question should set on each unit.
2. Total marks: $10 \times 4 = 40$ marks

8. BOTANY (OPTIONAL)

RANI CHANNAMMA UNIVERSITY, BELAGAVI

REVISED UG SYLLABUS VI SEMESTER

with effect from

Academic Year 2019-20 and onwards.

SUBJECT: BOTANY (OPTIONAL)

Semesters	Title of the Paper	No. of hours/ week/ paper	Duration of Examination	Internal Assessment Marks 20/10				Semester end examination marks
				I-Test	II-Test	Assignment	Attendance	
VI Sem Paper-I Theory	Microbiology, Cell Biology and Genetics.	04 hrs.	03 hrs	04	10	03	03	80
Practicals		04 hrs.	04 hrs	10				40
Paper-II Theory	Molecular Biology, Biotechnology and Immunology.	04 hrs.	03 hrs	04	10	03	03	80
Practicals		04 hrs.	04 hrs	10				40

Botany paper- I:Cell Biology and Genetics.

50 Hrs

Unit I: Cell Biology:

10 Hrs.

The cell:General organization of prokaryotic and Eukaryotic cells. Ultra-structure & functions of Nucleus, Plastids, Mitochondria, Golgi complex, Endoplasmic reticulum, Lysosomes, Peroxisomes & Vacuoles. Ultra-structure & functions of Plasma membrane & Cell wall.

Unit II: Morphology of Chromosomes:

06 Hrs.

Number, size, shape, types, centromere, SAT chromosomes, Ultra structure of giant Chromosomes, Ploidy and chromosomal aberrations.

Unit III: Cell division:

06 Hrs.

Mitosis and Meiosis in plants. **Cell cycle:** regulation of cell cycle.

Unit IV: Genetics:

22 Hrs.

Mendelism (Laws of inheritance, Monohybrid, Dihybrid Experiments). Gene interaction

(Allelic – incomplete dominance, co-dominance Non – allelic – Complementary, Supplementary, Epistasis) Linkage & crossing over, Alleles, Multiple alleles, Sex determination, Sex linked inheritance, Mutations, Problems related to the above topics.

Unit V: Evolution:

06 Hrs.

Origin of life, Lamarckism, Darwinism, Mutational and Modern concepts of evolution.

Practicals:

1. Study of Microscopes – Light microscope, phase contrast microscope & electron microscope.
2. Cytological techniques (Pre-treatment, fixation, preservation, cytological stains, Squash preparation, smear preparation, mounting media and permanent slides preparation).
3. Mitosis preparation (Squash)-onion root tips.
4. Meiosis preparation (Smear)-. Onion/Rheo Flower buds.
5. Micrometry.
6. Karyotype & Idiogram – Allium cepa.
7. Polytene chromosomes – Drosophila/ Chironomas
8. Heterozygotic translocation in Rheo-discolor
9. Genetic problems.
10. Genetic problems.

Suggested Reading:

1. Gupta P.K. - A Text Book of Cell and Molecular Biology- Rastogi Publication Meerut
2. Strick Burger M. – Genetics - Mc Millan Publishing Co.
3. Sinnot Dunn & Dobzhanasky – Principles of Genetics-Tata Macgrow Hill

4. Tamarin – Principles of Genetics -
5. Sharma A.K. and Sharma A: - Plant Chromosomes Analysis Manipulation and Engineering – Harward Academic Publishers,Australia.
6. L.R. Patki, B.L.Bhalachandra&I.H.Jeewaji- Genetics- S. Chand Publications.
7. P.S. Verma& Agarwal - Cell Biology & Genetics -
8. Benjamin Lewen – Gene VI & VII – New York Oxford University Press, USA.

RANI CHANNAMMA UNIVERSITY, BELAGAVI.

Semester-VI

Botany Practical-I (Cell Biology and Genetics)

Time: 4 Hours

Max Marks: 40

- Q.1 Make a temporary micro preparation of the squash/smear of the specimen **A**. Draw labelled diagrams of any two stages of cell division seen in your preparation and show to the examiner. **08**
- Q.2. Determine the length and breadth of the given material **B**, by micrometric method. **06**
- Q.3. Solve the genetic problems **C & D**. **08**
- Q.4. Identify and describe the cytological features with diagrams in slides **E, F, G** and **H**. **08**
- Submission of 3 mitosis and 2 meiosis slides. **05**
- Journal **05**

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B.Sc VI Semester Practical Examination

Subject: Botany Paper- II Instructions to Examiners.

Time: 4Hours Max Marks: 40

- Q.1.** Squash/Smear preparation of the specimen -**A** **8 marks**
(Preparation-4 marks, diagrams-2 marks, oral-2 marks).
- Q.2.** Specimen –**B** **6 marks**
(onion peeling cells or any permanent slide of algal specimen. Calibration-3 marks, diagram-1 mark, measurement of length and breadth -2 marks)
- Q.3.** Genetic problems – **C** and **D** **8 marks**
- Q.4.** Cytological Slides - **D, E, F** and **G** **8 marks.**
(one slide from mitosis, two slides from meiosis and one specimen/slide from polytene chromosomes/heterozygotic translocation/karyotype and idiogram. Identification-1/2mark, diagram-1/2 mark, description -2 mark).
- Submission of permanent slides of 3 mitosis and 2 meiosis. **5 marks**
- Journal** **5 marks.**

B.Sc.VI Semester Theory Examination
Sub: BOTANY Paper – I Pattern of Question Paper
Time: 03 hours Max. Marks: 80

All questions are compulsory

Q. I Answer any ten out of twelve (01 to 12 sub questions) 10 X 2 = 20

- From Unit I: Cell Biology: 02 sub questions.
- From Unit II: Morphology of Chromosomes: 02 sub questions.
- From Unit III: Cell division: 02 sub questions.
- From Unit IV: Genetics: 05 sub questions.
- From Unit V: Evolution: 01 sub question.

Q. II Answer any six out of eight (13 to 20 sub questions) 6X 5 = 30

- From Unit I: Cell Biology: 02 sub questions.
- From Unit II: Morphology of Chromosomes: 01 sub question.
- From Unit III: Cell division: 01 sub question.
- From Unit IV: Genetics: 03 sub questions.
- From Unit V: Evolution: 01 sub question.

Q. III Descriptive Answers

21. a) From Unit I: Cell Biology: 01 sub question. **1 X 10 = 10**

OR

b) From Unit II: Morphology of Chromosomes-01 sub question.

22. a) From Unit III: Cell division: 01 sub question. **1 X 10 = 10**

OR

b) From Unit IV: Genetics: 01 sub question.

23. a) From Unit IV: Genetics: 01 sub questions. **1 X 10 = 10**

OR

b) From Unit V: Evolution: 01 sub question.

Note: - Minor changes in the Question PaperPattern is permitted, with respect to the teaching hours allotted for each topic.

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Rani Channamma University, Belagavi.

B.Sc VI semester (w.e.f. 2019 -20)

Botany paper –II(Molecular Biology, Biotechnology & Immunology) 50 hrs.

Unit I: Nucleic Acids: 10 Hrs.

DNA & RNA, occurrence, types and chemical compositions, Experimental evidences for DNA as genetic material. Structure of DNA, Replication, Semiconservative method, RNA and types, post transcription changes.

Unit II: Gene Expression: 08Hrs.

Gene concept, Genetic code & protein synthesis. Regulation of gene expression in prokaryotes & eukaryotes.

Unit III: Recombinant DNA technology and Bioinformatics: 08 Hrs.

Enzyme, vector (plasmid PBR 322), marker gene, Steps of cloning technique, PCR and its application, Genomic DNA and cDNA library. Brief concept on Genomics and proteomics.

Unit IV: Biotechnology and Genetic engineering of plants: 12Hrs.

Basic concepts, principles and scope. Aims, strategies for development of transgenic plants(with suitable example). Agrobacterium-The natural genetic engineer. T-DNA and transposon mediated Gene tagging, Intellectual Property rights, possible ecological risks and ethical concerns.

Unit V: Microbial genetic manipulation and Immunology: 12 Hrs.

Microbial genetic manipulation: Bacterial transformation, selection of recombinant And transformants, genetic improvement of industrial microbes, nitrogen fixers & fermentation technology.

Immunology: Immuno-systems, Immunotechniques in Agriculture, ELISA method to detect Plant diseases & Monoclonal antibodies.

Practicals:

1. DNA estimation by DPA diphenyl amine method.
2. RNA estimation by orcinol method.
3. Extraction and estimation of protein from plant source,
1) Salt precipitation method 2) solvent method
4. Culturing of Rhizobium-YEMA media.
5. Culturing of Azotobacteria-ASHBY'S media.
6. Demonstration of Electrophoresis technique
7. Agarose gel electrophoresis.
8. Demonstration and comparison of GM Plants with Non GM Plants
(BT- Cotton, BT-Brinjal, BT Tomato).
9. Visit to Biotechnology Research Laboratory.

Suggested Reading:

1. Cell & Molecular Biology -- By E.D.F. De Robertis -- ISE Publication
2. Basic Biotechnology -- Colin Rateledge & Bjorn Kristiansen -- Cambridge Uni. Press.
3. A Text Book of Biotechnology – R.C. Dubey – S. Chand Publication
4. Cell Biology, Genetics Molecular Biology, Evolution & Ecology
-- P.S. Verma & V. K. Agarwal
5. Casida L.E. (1984)- Industrial Microbiology, Wiley Eastern, New Delhi.
6. Roitt- Immunology
7. Kubey – Immunology.
8. Fatima – Immunology

RANI CHANNAMMA UNIVERSITY, BELAGAVI.**B.Sc. VI Semester Practical Paper-II****(Molecular Biology, Biotechnology & Immunology)****Time: 4 Hours****Max Marks: 40**

- | | |
|---|-----------|
| Q.1. Estimation of DNA/RNA from the given sample A. | 10 Marks |
| Q.2. Estimation of Protein from the unknown sample B. | 10 Marks |
| Q.3. Identify and comment C and D. | 5 Marks |
| Project report submission and Viva voce. | 10 Marks. |
| Journal. | 05 Marks |

Rani Channamma University, Belagavi.**B.Sc VI Semester Practical Examination****Subject: Botany Paper- II Instructions to Examiners.****Time: 4Hours****Max Marks: 40**

- | | |
|--|-----------------|
| Q.1. Sample A- Plant resource
(Procedure- 05 marks, Preparation- 03 marks, Tabulation- 02 marks) | 10 marks |
| Q.2. Unknown Sample B-
(Procedure- 05 marks, Observation and results- 05 marks) | 10 marks |
| Q.3. Specimen C-GM/Non GM plant Material may be given
Specimen D- Any biotech instrument/ any bacterial culture may be given | 05 marks |
| Project report submission and Viva voce. | 10 marks |
| Journal | 05 marks |

B.Sc.VI Semester Theory Examination
Sub: BOTANY Paper – IIPattern of Question Paper

Time: 03 hours

Max. Marks: 80

All questions are compulsory

Q. I Answer any ten out of twelve (01 to 12 sub questions)

10 X 2 = 20

From Unit I: Nucleic Acids: 02 sub questions.

From Unit II: Gene Expression: 02 sub questions.

From Unit III: Recombinant DNA technology and Bioinformatics: 02 sub questions.

From Unit IV: Biotechnology and Genetic engineering of plants: 03 sub questions.

From Unit V: Microbial genetic manipulation and Immunology: 03 sub questions.

Q. II Answer any six out of eight (13 to 20 sub questions)

6X 5 = 30

From Unit I: Nucleic Acids: 02 sub questions.

From Unit II: Gene Expression: 01 sub question.

From Unit III: Recombinant DNA technology and Bioinformatics: 02 sub questions.

From Unit IV: Biotechnology and Genetic engineering of plants: 02 sub questions.

From Unit V: Microbial genetic manipulation and Immunology: 01 sub question.

Q. III Descriptive Answers.

21. a) From Unit I: Nucleic Acids: 01 sub question.

1 X 10 = 10

OR

b) From Unit I: Nucleic Acids: 01 sub question.

22. a) From Unit II: Gene Expression: 01 sub question.

1 X 10 = 10

OR

b) From Unit III: Recombinant DNA technology and Bioinformatics: 01 sub question.

23. a) From Unit IV: Biotechnology and Genetic engineering of plants: 01 sub question.

1 X 10 = 10

OR

b) From Unit V: Microbial genetic manipulation and Immunology: 01 sub question.

Note: - Minor changes in the Question PaperPattern is permitted, with respect to the teaching hours allotted for each topic.

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RANI CHANNAMMA UNIVERSITY, BELAGAVI

17BScCST61: Data Communications and Computer Networks	
Teaching Hours: 4 Hrs/week	Marks: Main Exam: 80 IA: 20
<p>Objective: To provide an introduction to the fundamental concepts on data communication and the design, deployment, and management of computer networks.</p> <p>Expected Learning Outcomes:</p> <p>Understand the basic concepts of data communications</p> <p>Understand the significance of protocols in communication</p> <p>Identify the different components and their respective roles in a communication system</p>	
UNIT I	08Hrs
Introduction: Data Communications, Networks, the internet, protocols and standards, network models – OSI model, TCP/IP protocol suite, addressing.	
UNIT II	08Hrs
Data and Signals: Periodic analog signals, digital signals, transmission impairment, data rate limits, performance.	
Digital transmission: Digital to digital conversion, analog-to-digital conversion, transmission modes.	
UNIT III	10Hrs
Physical Layer and Media: Analog transmission: Digital-to-analog conversion, analog-to-analog conversion. Multiplexing and Spread spectrum. Transmission media – Guided media and unguided media.	



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UNIT IV

12Hrs

Switching: Circuit-switched networks, datagram networks, virtual-circuit networks, structure of a switch.

Telephone networks, dialup modems, digital subscriber line, cable-tv networks

Detection and Correction: Errors, redundancy, detection versus correction, block coding, linear block codes, cyclic codes, checksum.

UNIT V

12Hrs

Data Link Control: Framing, flow and error control, noiseless and noisy channels, HDLC, point-to-point control.

Multiple Access: Random access ALOHA, controlled access, channelization.

Wired LANs: Ethernet. Wireless LANs. Connecting LANs, Backbone Networks, and Virtual LANs

References:

1. Behrouza A Forouzan, Data Communication & Networking, Tata McGraw Hill.
2. Andrew S. Tanenbaum, Computer Networks, 5th Ed, Pearson Education
3. William Stallings, Data and Computer Communications, 7th Edition, PHI.
4. <http://highered.mheducation.com/sites/0072967757/index.html>

Additional Reading:

5. Proakin, Digital Communications, Mc Graw Hill.
6. W. Stalling, Wireless Communication and Networks, Pearson.
7. Brijendra singh, Data Communication and Computer Networks, PHI.
8. Dr. Prasad, Data Communication & Network, Wiley Dreamtech

17BScCSCP62: Programming Lab- Data Communication and Networking	
Practical Hours: 4 Hrs/week	Marks: Main exam: 40
	IA: 10

Students shall study basics of serial communication ports and protocols.

Study serial port communication in Windows environment.

S/W Details: Ubuntu, Fedora Linux, NS2/NS3

Networking: NS-2/NS-3 has been developed to provide an open, extensible network simulation platform, for networking research and education. That is, provides models of how packet data networks work and perform, and provides a simulation engine for users to conduct simulation experiments. This lab gives in depth view of how computer networks works in real time. Simulation of various topologies shall be performed using ns2/ ns3 tool. They shall install Ubuntu, Fedora Linux, NS3, on their machines.

1. Program to connect two nodes
2. Program for connecting three nodes considering one node as a central node.
3. Program to implement star topology
4. Program to implement a bus topology.
5. Program for connecting multiple routers and nodes and building a hybrid topology.
6. Installation and configuration of NetAnim
7. Program to implement FTP using TCP bulk transfer.



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8. Program for connecting multiple routers and nodes and building a hybrid topology and then calculating network performance
9. Performance comparison of Routing protocols using Simulation tool
10. To implement a GoBack-N ARQ(Automatic Repeat Request) protocol.
11. To implement sliding –window protocol.
12. Simulation of error correction code (like CRC)
13. Simulation of HTTP Protocol using TCP Sockets

Note: NS3 is available on <https://www.nsnam.org/>

Further, In case of technical issue in implementing assignments using NS2/NS3 tool, appropriate tools may be used implement the following: signal conversion (analog-to-digital and vice-versa), switching, error detection and error correction, data link layer protocols.

17BScCST63: Web Programming	
Teaching Hours: 4 Hrs/week	Marks: Main Exam: 80 IA: 20
<p>Objective: To provide fundamental tools and techniques for developing web based applications.</p> <p>Expected Learning Outcomes:</p> <ul style="list-style-type: none"> • Understand the basic concepts of internet programming • Programming static and dynamic web pages • Ability to create an web based application 	

UNIT I 10Hrs

Applet Programming - Creating and executing Java applets, inserting applets in a web page.
Review of AWT Classes, Event Handling, Swing classes, Java swing - JApplet, icons and labels, text fields, buttons, combo boxes, tabbed and scroll panes, trees, tables.

UNIT II 10Hrs

Fundamentals of Web: Internet, WWW, Web Browsers, and Web Servers, URLs, MIME, HTTP, Security, the Web Programmers Toolbox. XHTML: Origins and evolution of HTML and XHTML, Basic syntax, Standard XHTML document structure, Basic text markup, Images, Hypertext Links, Lists, Tables.

HTML and XHTML: Forms, Frames in HTML and XHTML, Syntactic differences between HTML and XHTML. Cascading Style Sheets: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The Box model, Background images, The and <div> tags.

UNIT III 10Hrs

JAVA Script: Java Script: Overview of JavaScript; Object orientation and JavaScript; General syntactic characteristics; Primitives, Operations, and expressions; Screen output and keyboard input; Control statements; Object creation and Modification; Arrays; Functions; Constructor; Pattern matching using expressions; Errors in scripts; Examples.

UNIT IV 10Hrs

Java Script and HTML Documents: The JavaScript execution environment; The Document Object Model; Element access in JavaScript; Events and event handling; Handling events from the Body elements, Button elements, Text box and Password elements; The DOM 2 event model; The navigator object; DOM tree traversal and modification. Dynamic Documents with JavaScript.



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XML: Introduction; Syntax; Document structure; Document Type definitions; Namespaces; XML schemas; Displaying raw XML documents; Displaying XML documents with CSS; XSLT style sheets; XML Processors; Web services.

UNIT V

10Hrs

Perl and CGI: Basic Perl program, scalars, arrays, hashes, control structures, processing text, regular expressions, using files, subroutines, bits and pieces.

Developing CGI application, processing CGI, CGI.pm methods, creating HTML pages dynamically, carp, cookies.

Servlets and Java Server pages: Overview of servlets, servlet details, java server pages.

Database access through web: Architecture for database access. Database access with JDBC and MYSQL.

References:

1. Patrick Naughton And Herbert Schildt, Java The Complete Reference, TMH Publication .
2. Cay S. Horstmann and Gary Cornell, Core JAVA 2, Volume-II, 7/e, Pearson Education.
3. Robert W Sebesta, Programming the World Wide Web, 4th Edition, Pearson Education.
4. Chris Bates, Web Programming -Building Internet Applications, Wiley Student edition
5. Ivan Bayross, Web enabled commercial application development using HTML, DHTML, JavaScript, PERL-CGI, BPB Pub.
6. Gopalan N.P. and Akilandeswari J., Web Technology, Prentice Hall of India.

Additional Reading:

7. Steven M. Schafer, HTML, CSS, JavaScript, Perl, Python and PHP - Web standards Programmer's Reference, Wiley Publishing, Inc..
8. Jeffrey Dwight et al, Using CGI, Second Edition, Prentice Hall, India,
9. Thomas A. Powell, The Complete Reference HTML & XHTML, Tata McGraw Hill.
10. <http://html.com/> , <https://javascript.info/>
11. <https://www.w3schools.com/html/default.asp>, <https://www.w3schools.com/css/default.asp>

17BScCSCP64: Programming Lab- Web Programming Lab.

Practical Hours: 4 Hrs/week

Marks: Main exam: 40

IA: 10

1. Write a java program to demonstrate key events by using Delegation event model.
2. Write a java program to implement mouse events like mouse pressed, mouse released and mouse moved by means of adapter classes.
3. Write a java program to demonstrate window events on frame.
4. Write an applet to display a simple message on a colored background.
5. Write an applet that computes the payment of a loan based on the amount of the loan, interest rate and the number of months.
6. Write an applet to perform the 4 basic arithmetic operations as buttons in a form accepting two integers in textboxes and display their result.
7. Write a java program to design a registration form for creating a new eMail account.
8. HTML (five assignments may be identified)
 - a. Program to illustrate various HTML tags: body and pre-tag, font tag, text formatting tags, ordered/unordered list tags, image tag, anchor tag, table tag, frame tag, form tag, span tag. Use suitable examples to illustrate various tags in combination.
 - b. Illustrate importance of CSS.



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- c. Illustrate embedded multimedia ie To create a Html multimedia support to play different audio and video formats in a browser
9. Develop and demonstrate a XHTML document that illustrates the use external style sheet, ordered list, table, borders, padding, color, and the tag
10. Develop and demonstrate a XHTML file that includes Javascript script for the following problems:
a) Input : A number n obtained using prompt Output : The first n Fibonacci numbers
b) Input : A number n obtained using prompt Output : A table of numbers from 1 to n and their squares using alert
11. Develop and demonstrate a XHTML file that includes Javascript script that uses functions for the following problems:
12. Parameter: A string Output: The position in the string of the left-most vowel
13. Parameter: A number Output: The number with its digits in the reverse order
14. Design an XML document to store information about a student in an affiliated college affiliated to RCUB. The information must include USN, Name, Name of the College, Brach, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.
15. Write a Perl program to display various Server Information like Server Name, Server Software, Server protocol, CGI Revision etc
16. Write a Perl program to accept LINUX command from a HTML form and to display the output of the command executed.
17. Write a Perl program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings
18. Write a Perl program to insert name and age information entered by the user into a table created using MySQL and to display the current contents of this table
19. Using Perl and MySQL, develop a program to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings

URL:

Java Applet tutorial: <https://www.javatpoint.com/java-applet>,
https://www.tutorialspoint.com/java/java_applet_basics.htm

JavaScript tutorial: <https://www.w3schools.com/js/default.asp>

PHP tutorial: <https://www.tutorialspoint.com/perl/>



Theory Paper Evaluation Scheme

(i) Internal Test– 20 Marks:

Test: 14 marks

Attendance: 03 marks

Seminar/assignment: 03 marks

Two tests shall be conducted, one during the mid of the semester and another at the end of the semester for 1 hour 15 mnts duration each.

First IA Marks: 20 weightage: 06

Second IA Marks: 20 weightage: 08

Teachers are encouraged to conduct the test either using any open source learning management system such as Moodle (Modular object-oriented dynamic learning environment) Or a test based on an equivalent online course on the contents of the concerned course(subject) offered by or build using MOOC (Massive Open Online Course) platform.

Note: Guidelines given by the University from time-to-time shall be followed for IA.

(ii) Examination-

Max Marks: 80

Duration - 3 Hours.

Theory question paper pattern:-		Remarks
Questions	Marks	
SECTION A Q1. Answer all the questions 10 sub questions (a-j)	2 x 10 =20	ability to write short answers upto 150 words
SECTION B Q2. through Q6: Answer any four questions	4 x 5=20	ability to write answers upto 500 word
SECTION C Q7. through Q11: Answer any four questions	4 x 10=40	ability to write descriptive answers

Note: For Section-B, one question from each unit shall be considered. For Section-C, one question from each unit shall be considered.



Programming Lab. i.e. Practical Evaluation Scheme

(i) Internal Test– 10 Marks:

Test: 05 marks

Attendance: 03 marks

Seminar/assignment: 02 marks

Two tests shall be conducted, each of 05 marks, and average of the two shall be considered as final.

Duration of IA test: 45 mins.

Students shall design and implement the programs/assignments given from the set of assignments provided at the beginning of the course commencement.

Course teacher are encouraged to test the students by giving the students problems from the course topic other than the set of assignments given to strengthen student's ability in problem solving

Note: Guidelines given by the University from time-to-time shall be followed for IA.

ii) Practical Examination- 40 Marks Duration - 3 Hours.

Certified Journal is compulsory for appearing Practical Examination

Students shall be given two programming assignments taking into consideration of duration of the time allotted to students for writing, typing and executing the programs.

Algorithm/program design : 15

Execution : 15 (includes program code correctness and correct execution results)

Journal : 05

Viva-Voce : 05

10. STATISTICS (OPTIONAL)

RANI CHANNAMMA UNIVERSITY, BELAGAVI

Details of UG Syllabus

2019-20 onwards

B.A/ B.Sc. COURSE IN STATISTICS (OPTIONAL)

Semesters	Title of the Paper	Teaching Hours	Marks Methods	Book Reference
VI Sem	Paper – I : Statistical quality management and Econometrics	5 Hours	Theory – 80 IA – 20	Prescribed in the Syllabus.
	Paper – II : Operations Research	5 Hours	Theory – 80 IA – 20	Prescribed in the Syllabus.

B.A/ B.Sc. COURSE IN STATISTICS (OPTIONAL)

SIXTH SEMESTER THEORY PAPER-I

Total: 50 Hours.

STATISTICAL QUALITY MANAGEMENT AND ECONOMETRICS

Unit: 1.Introduction:

Quality assurance and management, Quality pioneers, Quality costs. Aims & objectives of statistical process control. Chance & assignable causes of variation. Statistical Quality Control, importance of Statistical Quality Control in industry.

10 Hours

Unit: 2.Control charts for variables:

Theoretical basis and practical background of control charts for variables. 3 -sigma limits, Warning limits and probability limits. Criteria for detecting lack of control. Derivation of limits and construction of a Mean (\bar{x}) and R-charts and interpretation. Rational subgroups. Group control charts & Sloping control charts. Natural limits & specification limits .Process capability studies.

10 Hours

Unit: 3. Control charts for attributes: .np-chart, p-chart c-chart and u-chart. Basis, construction and interpretation. OC and ARL for variables and attribute charts.

10 Hours

Unit: 4.Time Series Analysis:

Components of time series. Additive and Multiplicative models .Measurement of trend by moving averages and by least squares. Construction of seasonal indices by simple averages and ratio to moving averages and link relative method.

10 Hours

Unit: 5.Econometrics:

Definition and scope of econometrics. Relationship between variables, the simple linear regression model, the ordinary least squares method (OLS), Statistical assumptions, properties of least squares estimators.

10 Hours

SIXTH SEMESTER: PRACTICAL PAPER-I

STPR-6.1: PRACTICAL

2. Control charts - I
3. Control charts - II
4. Control charts - III
5. Econometrics - I
6. Econometrics -II
7. Time series- I
8. Time series- II
9. Time series- III

Books for study:

1. Grant,E.L.and Leavenworth,R.S(1988):Statistical Quality Control,6th edition,McGrawHill
2. Gupta R.C.: Statistical Quality Control, - Khanna Pub.Co.
3. Montgomery, C.D. (1999): Introduction to Statistical Quality Control, Wiley Int.Edn.
4. Gupta S.C and Kapoor V.K.: Fundamentals of Applied Statistics- Sultan Chand & Sons publications.
5. Basic Econometrics-Damodar Gujarati.
6. S.Shyamala,Navadeep Kaur,T.Arul Pragasam:A text book on Econometrics;Theory and Applications-Vishal Publ .Co.,Julhandhar
7. Srivatsava.O.S(1983):A Text book of Demography,Vikas Publishing.

Books for Reference:

1. Cowden, D.G. (1960): Statistical Methods in Quality Control,. Asia Publ. House.
2. Mahajan,M (2001): Statistical Quality Control-Dhanpat Rai & Co.(P) Ltd.
3. Medhi, J.(2001)Stochastic Processes,New Age Pub.
4. Paul A Mayer:Introduction to probability Theory and its applications-Prentice Hall.
5. Cox,.P.R.(1970):Demography, Cambridge Uni.Press

B.A/ B.Sc.COURSE IN STATISTICS (OPTIONAL)

SIXTH SEMESTER THEORY PAPER-II

Total: 50 Hours.

OPERATIONS RESEARCH

Unit: 1. Linear Programming Problem (LPP):

Definition and Scope of Operations Research (OR). Definition, Basic Concepts and Formulation of an LPP. Mathematical form of general LPP, Standard LPP, Slack, Surplus and artificial variables, Feasible solution, Basic feasible solution, Optimum solution. Graphical solution.

Simplex algorithm-Big-M Method and. Examples.

15 Hours

Unit:2. Transportation problem:

Definition and mathematical form of TP, Feasible solution, Basic feasible solution, Optimum solution. Methods of finding BFS: Northwest corner rule, Unit penalty method (Vogel's approximation method) and matrix minima method, Method of finding optimum solution to a

TP, Unbalanced TP. Simple problems.

10 Hours

Unit: 3. Assignment problem:

Definition and mathematical form of assignment problem, procedure of solving assignment problem. Simple problems.

05 Hours

Unit: 4.Statistical Decision Theory:

Statistical Decision problem, Maximin, Maximax, Minmaxi Laplace and expected payoff criteria. Regret function, Expected value of perfect information. Decision tree analysis. 10 Hours

Unit: 5. Inventory theory:

Description of Inventory system. Inventory costs. Demand lead time. EOQ model with and without shortages. EOQ model with finite replenishment. Probabilistic demand. News paper boy problem.

10 Hours

SIXTH SEMESTER: PRACTICAL PAPER-II

STPR-6.2: PRACTICAL

1. Linear Programming Problem-I: Formulation of LPP.
2. Linear Programming Problem –II: Graphical method for solving LPP
3. Linear Programming Problem-III: Simplex and Big-M methods to solve LPP.
4. Transportation problem
5. Assignment problem
6. Decision theory- I.
7. Decision theory –II
8. Inventory theory- I
9. Inventory theory –II

Books for Study:

1. Kantiswaroop, Man Mohan and P.K Gupta (2003): Operations Research-Sultan Chand & Co.
2. Churchman C.W, Ackoff R.L and Arnoff E.L (1957): Introduction to Operations Research-John Wiley.
3. Shenoy,G.V.,Srivatsava,U.K and Sharma,S.C.: Operations Research for Management, New Age International.
4. Barlow R.E & Proschan-Statistical theory of Reliability & Life testing-Holt Rinhart&Winston.Inc., Newyark

Books for Reference:

1. Mustafi C.K: Operations Research Methods and Practice- New age Publication
2. Mittal K.V: Optimization Method- New age Publication
3. Kapoor V.K: Operations Research- Sultan Chand & Co.
4. Narag,A.S..Linear Programming and Decision making. - Sultan Chand & Co.

Question Paper Pattern

WITH EFFECT FROM 2019-20.

Part- A In all 12 Questions to be asked

- Questions must be numbered from 1 to 12.
- Each question carries **2** marks.
- Students have to answer any **10** questions
- There should not be any multiple choice questions.
- At least two questions should be set on each unit.
- Total marks $2 \times 10 = 20$ marks.

Part- B In all 6 Questions to be asked

- Questions must be numbered from 13 to 18.
- Each question carries **5** marks.
- Students have to answer any **4** questions.
- Out of six questions, three questions should be problem oriented.
- At least one questions should be set on each unit
- Total marks $5 \times 4 = 20$ marks.

Part- C In all 6 Questions to be asked

- Questions must be numbered from 19 to 24.
- Each question carries **10** marks.
- Students have to answer any **4** questions
- At least one questions should be set on each unit
- Total marks $10 \times 4 = 40$ marks.

11. ZOOLOGY (OPTIONAL)

RANI CHANNAMMA UNIVERSITY, BELAGAVI
ZOOLOGY (Optional)
Semester Scheme (CBSC – Pattern)
(B.Sc VI semester)

Semesters	Syllabus	Total Hours	Theory & Practical/ Week
I	BIOLOGY OF NON-CHORDATES	50hrs.	4 hrs.
	PRACTICAL	12	4 hrs.

THEORY MARKS			PRACTICAL MARKS		
Internal	Annual	Total Marks	Internal	Annual	Total Marks
20	80	100 marks	10	40	50 marks

Question paper pattern for THEORY examination

Que.No.	Marks	Solve	Total Marks
I	02	10	20
II	04	05	20
III	10	04	40
TOTAL --- 80 MARKS			

PRACTICAL pattern for examination

Que.No.	Solve	Total Marks
I	Dissection (Explain any one system)	06
II	Mounting	05
III	Identification / Spotting (12)	24
IV	Journal	05
TOTAL --- 40 MARKS		

With Effect from
2019-20

B.SC SIXTH SEMESTER (6.1) PAPER I (APPLIED ZOOLOGY)

Sericulture:

9 Hrs

Mulberry silkworm and life history of *Bombyx mori*
Rearing of Silkworm: Rearing appliances, maintenance of rearing room,
Chawki rearing, Late age rearing,
Spinning of cocoons, cocoon processing, stiffling and reeling.
Silkworm diseases like Muscardine, Grasserie, Flacherie & Pebrine

Apiculture:

8 Hrs

Species of honey bees, life history
Methods of bee keeping, products of bees and their economic importance.
Insect Pest Management: Natural control and applied control of pests
Applied Control: Mechanical, physical, cultural, chemical control
Integrated pest management

Vermitechnology:

6 Hrs

Species of Earthworm used in vermitechnology,
Vermiculture technique and importance of vermiculture
Brief account of Vermicompost, vermiwash and vermicast

***Aquaculture:* (12 Hrs)**

Prawn fisheries: Species of prawns, culture of freshwater and marine prawns,
preservation and processing of prawns 5 Hrs
Pearl culture: Pearl producing molluscs, pearl formation,
pearl producing sites in India. Quality and composition of pearl
Pearl industry: Artificial insertion of nucleus 5 Hrs
Pisciculture: Brief technique of fish culture, Composite fish culture
Preservation of fishes and their by-products 5 Hrs

Animal husbandry:

Poultry: Breeds of fowl, diseases of poultry, maintenance of poultry farm.,
Backyard and Cage system of rearing
Composition of egg and nutritive value of egg 6 Hrs
Dairy technology: Cattle and Buffalo breeds (both exotic and indigenous)
Diseases of cattle and buffalo. Products and byproducts
Composition of milk and nutritive value of cow milk and buffalo milk 6 Hrs

Question paper pattern for theory examination B.Sc Sixth Semester (Paper – I)

Q. I	2 marks	12 questions to be given	Solve any 10	20 marks
	5 marks	6 questions to be given	Solve any 5	30 marks
	10 marks	2 questions to be given	Solve any 1	10 marks
	10 marks	2 questions to be given	Solve any 1	10 marks
	10 marks	2 questions to be given	Solve any 1	10 marks

**REFERENCE BOOKS for BSc Sixth Semester (P-I) -
Zoology**

	Title of the Book	Author (s)	Publisher(s)
1	Economic Zoology	Shukla G S and Upadhyay V B	Rastogi Publications, Meerut
2	General and applied Ichthyology (Fish and Fisheries)	S K Gupta and P C Gupta	S Chand & Company Pvt. Ltd. New Delhi
3	Handbook of animal husbandry	S N Tata (Chief Editor)	Published by ICAR, New Delhi
4	Manual on sericulture Volume 1: Mulberry Cultivation	G Rangaswami and M N Narasimhanna	Food & Agriculture Organization (FAO) of the United Nations, Rome
5	Manual on sericulture Volume 2: Silkworm rearing	G Rangaswami and M N Narasimhanna	Food & Agriculture Organization (FAO) of the United Nations, Rome
6	Manual on sericulture Volume 3: Silk reeling	G Rangaswami and M N Narasimhanna	Food & Agriculture Organization (FAO) of the United Nations, Rome
7	Manual on sericulture Volume 4: Non mulberry silks	G Rangaswami and M N Narasimhanna	Food & Agriculture Organization (FAO) of the United Nations, Rome
8	Appropriate sericulture techniques	M S Jolly	International centre for Training and Research in Tropical Sericulture, Mysore
9	Poultry Farm Guide	R Venkatakrishnan	Balalji Publications, Madras
10	Poultry Farming	O Muni Reddy	Suguna Publishers, Bangalore
11	Apiculture	K.V.Jayashree, C S Tharadevi and N Arumugam	Saras Publication
12	Vermitechnology, Vermiculture, Vermicompost and Earthworms	Chauhan Avnish	LAP Lambert Academic Publishing
13	Principles Of Aquaculture	C. J. Khune, Rajendra V. Tijare and S R Sitre	Himalaya Publishing House
14	Dairy Science and Technology	Drake Ward	Larsen and Keller Education

B.Sc Sixth Semester (Practical I) Practical Syllabus Total Practicals – 10

- | | | |
|----|---|---------------------|
| 1. | Project on any one of the applied branch studied in theory | 1 Practical |
| 2. | Study of mulberry silkworm and life cycle | 1 Practical |
| 3. | Types of non mulberry silkworms in brief and silkworm diseases (pebrine, muscardine, grasserie and flacharie) | 1 Practical |
| 4. | Species and castes of honey bees | 1 Practical |
| 5. | Agricultural pests and domestic pests (total 6 varieties) | 1 Practical |
| 6. | Study of fisheries: Molluscs (3), Crustaceans (3) and Pisces (6) | 1 Practical |
| 7. | Study of varieties of cow and buffalo (from chart / photographs) | 2 Practicals |
| 8. | Vermiculture: Study of types of earthworm species | 1 Practical |
| 9. | Study of poultry breeds | 1 Practical |

Question paper pattern for practical examination

Question Number	Spotting	Total marks
I	Sericulture	3
II	Apiculture	3
III	Pest management	3
IV	Pisciculture	3
V	Vermiculture	3
VI	Animal Husbandry (Cow and Buffalo)	6
VII	Prawn & Pearl culture	4
VIII	Project report (5 marks) & Viva (5 marks)	10
IX	Journal	5
	Total	40

B.Sc Sixth semester (6.2) Paper II (Microbiology and Modern techniques in Biology)

Microbiology (18 Hours)

Microscopy: Compound microscope and its functions. Dark field microscope, Fluorescent microscope, Phase Contrast Microscope and Electron Microscope
Uses of different types of microscopes

Sterilization and other techniques: Physical and chemical methods

Bacteria: Classification based on shapes, structure. Bacterial reproduction and growth.

Virus: Morphology, chemical properties, classification, nomenclature, DNA & RNA viruses

Fungi: Structure, classification and reproduction, Yeasts

Fermentation: Types of fermentor and basic functions. Methods of preservations and criteria for the selection of microorganisms

Production of antibodies: Penicillin, Streptomycin, Enzyme protease, Riboflavin 2

Oral microbial flora of the human body
Role of microbes in environment

Nanotechnology: (5 Hrs)

Introduction, History, Name, Tools and Techniques in Nanotechnology.
Nanobiology - application of Nano in biology- Nano drug administration, diagnostic And therapeutic applications. Lotus effect, Gold and Silver Nanotechnology.
Curcumin phytochemicals, Cinnamon in green nano technology

Bioinformatics (7 Hrs)

Introduction: Definition, Goal of Bioinformatics, Sequencing - Sequences analysis and Structure analysis. Applications of Bioinformatics

Classification of Biological Data Bases. Characteristics of FASTA (Fast Alignment), BLAST (Basic Local Alignment Search Tool)

Aims and goals of Human Genome Project: Main findings of human genome project.
Prediction and tools for gene prediction. Comparative genomics

Proteomics: Two dimensional Gel Electrophoresis Mass spectrometry, SDS_PAGE. Structure of protein: Primary, Secondary, Tertiary and Quarternary.

Protein structure prediction [Ab initio modeling Example Rosetta]
Application of Proteome analysis, the future of Proteomics

Methods in Biology (10 Hours)

Techniques of cell fraction and centrifugation.
Homogenization and cell tissue disruption, centrifugation, ultra centrifugation
DNA sequencing, in situ hybridization, DNA microchips
Genetic engineering in animals - Transgenic mouse, Transgenic sheep,
Genetically altered fish, mosquito and Drosophila.

Gene therapy in Humans

Histochemical and Immunization Techniques: ELISA, RIA, Flow cytometry

Nucleic acid blotting & their applications: Southern blotting, Northern blotting, Western blotting

Radioisotopes: Techniques in Biochemistry. Types of radioactive decay- Alpha, Beta emission
& Gamma rays

Biological applications of Radioisotopes

Research Methodology: (10 Hours)

Meaning and objectives of research, motivation in research, research and scientific method,
understanding the research problem, Sampling Design (Sample Survey),
methods of data collection, analysis of data, Interpretation and report writing,
role of computer in research

**Question paper pattern for theory examination
B.Sc Sixth Semester (Paper – II)**

Q. I	2 marks	12 questions to be given	Solve any 10	20 marks
Q.II	5 marks	6 questions to be given	Solve any 5	30 marks
Q.III	10 marks	2 questions to be given	Solve any 1	10 marks
Q.IV	10 marks	2 questions to be given	Solve any 1	10 marks
Q.V	10 marks	2 questions to be given	Solve any 1	10 marks

REFERENCE BOOKS for BSc Sixth Semester (P-II) - Zoology

	Title of the Book	Author (s)	Publisher(s)
1	General Microbiology	Powar C B and Daginawala H F	Publisher: Himalaya Publishing House
2	Experiments in Microbiology and Biotechnology	K R Aneja	New Age International publishers, New Delhi
3	Microbiology	Dr P D Sharma	Rastogi Publications, Meerut
4	Molecular Biology	David Freifelder	Narosa Publishing House, New Delhi
5	Microbiology: Fundamentals and applications	S S Purohit	Agrobios (India), Jodhapur
6	An introduction to Microbiology	P Tauro, K K Kapoor and K S Yadav	Wiley Eastern Limited New Delhi
7	Microbiology (General and applied)	A Mani, A M Selvaraj, L M Narayanan and N Arumugam	Saras Publications, Nagercoil, Tamilnadu
8	Introduction to Nanotechnology	Charles P Poole Jr and Frank J Owens	John Wiley and Sons, New Delhi
9	Nano: The essentials (Understanding Nano Science and Nanotechnology)	T Pradeep	Tata McGraw Hill Publishing Company, New Delhi
10	A text book of Bioinformatics	Vinay Sharma, Ashok Munjal and Asheesh Shankar	Rastogi Publications, Meerut
11	Biotechnology	B D Singh	Kalyani Publishers, New Delhi
12	Biology: A Functional approach	M B V Roberts	Thomas Nelson and Sons Ltd, Thames
13	Concepts in Molecular Biology	S C Rastogi, V N Sharma and Anuradha Tandon	Publisher: New Age Publishers
14	Research methodology: Methods and techniques	C R Kothari	New Age International publishers, New Delhi

B.Sc Sixth Semester (Practical II) Practical Syllabus Total Practicals – 11

1.	Measurement of micro organisms (Micrometry)	1 Practical
2.	Preparation of liquid medium (Broth)	1 Practical
3.	Preparation of solid media (PDA medium and PDA plates)	1 Practical
4.	Preparation of agar slants.	1 Practical
5.	Study of different types of bacteria, viruses and fungi causing diseases in man	1 Practical
6.	Bacterial cell counting using haemocytometer.	1 Practical
7.	Simple and Grams's staining differentiation of bacteria	1 Practical
8.	Isolation, Identification and enumeration of Bacteria/Protozoa from moist soil or sewage water	1 Practical
9.	Practical application of Bioinformatics: Tool BLAST and FASTA to find out sequence of nucleotides in undesired gene/Amino acid in desired protein	1 Practical
10.	Study of Microbiological Lab Equipments: Microscope, Centrifuge, Autoclave, Pressure cooker, Laminar air flow, Streak Plate, Inoculation needle etc.	2 Practicals

Question paper pattern for practical examination

I	Microbiology, Nanotechnology	8
II	Bioinformatics	6
III	Spotting (1 each from bacteria, virus, fungi)	6
IV	Viva	5
V	Submission of detailed report on specific local problem (research)	10
VI	Journal	5

Total 40

RANI CHANNAMMA UNIVERSITY, BELAGAVI
COURSE STRUCTURE AND SCHEME OF EXAMINATION FOR B.SC DEGREE (SEMESTER) IN MICROBIOLOGY
(WITH EFFECT FROM 2019-20)

Semester	Paper Title	Instruction Hrs per week		Examination Marks		Internal Assessment Marks		Duration of Examination Hrs		Total Marks
		Theory	Practical	Theory	Practical	Theory	Practical	Theory	Practical	
VI	Paper 6.1 Food and Industrial Microbiology	4		80		20		3		150
	Practical 6.2 Food and Industrial Microbiology		4		40		10		4	
	Paper 6.3 Immunology and Medical Microbiology	4		80		20		3		150
	Practical 6.4 Immunology and Medical Microbiology		4		40		10		4	

MICROBIOLOGY

SEMESTER- VI

PAPER 6.1: FOOD AND INDUSTRIAL MICROBIOLOGY

Total hours allotted: 50

PART-A: FOOD MICROBIOLOGY

Total hours allotted: 25

1. Food and Microorganisms:

Food as a substrate for microorganisms and sources of contamination of food.

2-hours

2. Food Spoilage and Poisoning:

a) Spoilage of canned foods, cereals, Fruits, vegetables, meat and fish.
Food sanitation and control.

b) Spoilage of canned foods, cereals, Fruits, vegetables, meat and fish.
Food sanitation and control.

5-hours

3. Fermented foods:

Soya sauce, olives, idly, butter milk, Yoghurt, cheese and Kefir.

4-hours

4. Food preservation:

Principles of food preservation, Physical and chemical methods.

4-hours

5. Microbiology of Milk:

Sources of milk contamination , methods to detect microbial spoilage by SPC, Reductase test, Biochemical changes of milk souring, Gassy

fermentation, Proteolysis, Lipolysis, Ropiness, Phosphatase test, Clot on Boiling test. Starter culture and its role.

8-Hours

6. Methods of Preservation of milk and milk Products:

Pasteurization and Sterilization.

2-Hours

PART-B: INDUSTRIAL MICROBIOLOGY

Total hours allotted: 25

1. History, scope and development of industrial microbiology.

1 -Hour

2. Isolation and screening of industrially important microorganisms.

2-hours

3. Strain improvement methods.

1-Hour

4. Types of industrial fermentation process:

Batch, Continuous, surface, submerged and solid state fermentation.

2- Hours

5. Media components and formulation:

Crude media components, anti foam agents, precursors, inducers, inhibitors and buffering agents.

2-Hours

6. Sterilization of media and raw materials maintenance of sterility at critical points during fermentation.

2-Hours

7. Inoculums preparation.

1-hours

8. Process parameters:

Aeration, Agitation, Temperature regulation, Foam regulation and pH regulation .

3- Hours

9. Fermentors:

Basic structure , construction and various types- Typical stirred aeriated fermentor, Tower fermentor and Bubble cap fermentor.

10.Down Stream processing:

Precipitation, Filtration, centrifugation, distillation, Cell disruption, solvent recovery, drying and crystallization.

3- Hours

11.Industrial production of chemicals:

Alcohol, Lactic acid, Penicillin and Protease.

3-hours

12.Role of microorganisms for production and recovery of minerals and Petroleum.

2-hours

PRACTICAL: 6.2-Food and Industrial Microbiology

1. Isolation and identification of microbes from infected fruits, vegetables and cereals.
2. Isolation and identification of microorganisms from curd, idli, butter & stored foods-Jams, Jellies, sauce and pickles.
3. Bacterial examination of milk by SPC & DMC method.
4. Methylene Blue Reduction test (MBRT) for quality assessment of milk.
5. Estimation of fat content in milk by Gerber's methods.
6. Estimation of Lactose in Milk.
7. Estimation of Lactic acid from curd samples.
8. Observation of industrially important microorganisms.
9. Production of Wine from grapes.
10. Estimation of alcohol content.
11. Preparation of banana juice by pectinase.
12. Production and estimation of citric acid by titrimetric method.

13. Study of different types of fermentation (Charts).

Note: Visit to Industries / Research laboratories Dairy industries. Distilleries, Pharmaceuticals and Pathological laboratories. A report on the visit should be written and submitted with practical record.

REFERENCE:

1. Banwart.G.J. 1987 "Basic Food Microbiology" CBS Publishers and Distributors New Delhi.
2. Betty C. Hobbs " Food Microbiology" Arnold- Heinemann Publishing Private Ltd. New Delhi.
3. Casida, Jr.L.E. (1996)Industrial Microbiology New Age International Publishers New Delhi.
4. Colwod. D. 1999 "Microbial Diversity" Academic Press.
5. Frazier and Westhoff " Food Microbiology" Tata Mc Graw Hill Publication co.Ltd. New Delhi.
6. Hammer B.W. and Babal "Dairy Microbiology" Prentice Hall incorporate. Londn.
7. Jay.J.M. "Modern Food Microbiology" CBS Publishers and Distrbutors. New York.
8. Peleczar, M.J.Chan.E.C.S. and Krieg, N.R.- 1982 "Microbiology" Tata Magraw Hill Book co. New York.
9. Prescott. Lansing.M., Harely John. P and Klein Donald, A " Microbiology" WCB Mc Graw Hill New York.
- 10.Reed. G. 1982 " Industrial Microbiology" MacMillan Publications Ltd. Wisconsin.
- 11.Ribonson R.T. 1990 "Dairy Microbiology Elsevier Application Dieness London.
- 12.Salle. A.J. "Fundamental Principles of Bacteriology" Tata McGraw Hill Publishing Company Ltd.New Delhi.
- 13.Stanier, R.Y. Ingraham J.L "General Microbiology" Prentice Hall Of India Pvt Ltd. New Delhi.

14. Vernam A.H. and Evans. M.G. "Foodborne Pathogens" Wolfe Publishing House. London.
15. Waites Michael J. Morgan Neil L. Rockey John S. and Gray Higon,
"Industrial Microbiology- An Introduction " Blackwell Science, Delhi.

Paper 6.3 Immunology And Medical Microbiology

Total hours allotted: 50

PART-A: IMMUNOLOGY

Total hours allotted: 25

- 1. History and Scope of Immunology.** **2-Hours**
- 2. Immunity.** **2-Hours**
Types-Natural, Acquired, Active & Passive.
- 3. Antigens.** **2-Hours**
Nature& types, Factors influencing antigenicity
- 4. Antibodies.** **2-Hours**
Structure ,types,Properties & functions of immunoglobulins.
- 5. Antigen & Antibody reactions.**
Agglutination, Precipitation, Complement Fixation test, Neutralization test, Opsonization.Gel-diffusion techniques, Immuno electrophoresis, Labelled Antibodies-RIA, ELISA and Immuno Fluorescent Techniques. **6-Hours**
- 6. Complement System.** **2-Hours**
Properties, Components, Pathways And Functions. **2-Hours**
- 7. Cells, Tissues and Organ involved in immune system.** **2-Hours**
- 8. Immune response.**
CML, MHC, AMI, Immunological memory and immunological tolerance. **3-Hours**
- 9. Hypersensitivity** **2-Hours**
- 10.Vaccines.** **2-Hours**
Types and significance.

PART-B: MEDICAL MICROBIOLOGY

Total hours allotted: 25

1. History and development of medical microbiology. Normal Flora of human body. **2- Hours**
2. Infection.
Types, Modes of Transmission and port of entry. **2-Hours**
3. Pathogenesis.
Virulence- Attenuation And Exaltation with an example each. **2-Hours**
4. Pathogens.
Morphology, Cultural and biochemical characteristics, classification, resistance, Pathogenesis, Clinical symptoms, laboratory diagnosis, epidemiology, prophylaxis and treatment of the following.
 - a. Bacterial diseases- Tuberculosis, Cholera, Typhoid and Syphilis.
 - b. Viral diseases- Hepatitis, Poliomyelitis and AIDS.
 - c. Fungal diseases- Malaria, Trichomonas & Amoebiosis.**15-Hours**
5. Antibiotics.
General Characteristics and types of antibiotics, mode of action of Penicillin, Streptomycin & Chloramphenicol. **4-Hours**

PRACTICAL- 6.4 Immunology and Medical Microbiology

1. Isolation and identification of microorganisms from ear, nose, throat and sputum
(Growth on blood agar, chocolate agar, Mackonkey agar, Nutrient agar)
2. Isolation and identification of microorganisms from clinical sample- Urine (Growth in alkaline peptone water, blood agar, Mackonkey agar).
 - a. Semi quantitative estimation of C+V
 - b. Chemical analysis of urine crystal identification of sugar and protein.

3. Blood grouping and calculation of allelic frequencies.
4. Differential count of WBC.
5. Coagulase test.
6. WIDAL test.
7. VDRL Test.
8. Study of Pathogenic Microorganisms Slides.

REFERENCE:

1. Clark. W.R. "The Experimental foundations of Modern Immunology (1991): John Wiley and Sons.Inc.
2. Mackie & McCartney-Medical Microbiology-14th Ed.
3. Vol.1: Microbial infections.
4. Vol. 2: Practical Medical Microbiology: 1996 Churchill. Livingstone London.
5. Bailey & Scott's Diagnostic Microbiology.
6. Ellen Jo Baron, Lance R. Peterson. Sydney M. Feingold 9th Ed.1994 Moseby.
7. Franklin, T.J. Snow G/A. Biochemistry of Antimicrobial Action: (1981): Chamman and Hall New York.
8. Roitt, I.M: Essential Immunology (1995): Blackwell Scientific Publication. Oxford.
9. Roth, J.A. (1985): Virulence Mechanism of Bacterial Pathogens. American Society for Microbiology, Washington D.C.
10. Smit.C.G.C. "Epidemiology and infections" (1976): Medowfief Press Ltd.Shildon, Ehglad.
11. Stiehm. F. (1980): Immunological Disorders in infants and Childerne" (1980): W.B. Saundes & Co., Philadelphia.
12. Stites, D.P. Stobo J.D.Feudenberg, H.H. Wells.J.V Basic and Clinical Immunology, (1984): Lange Medical Publications, Los Altos., Clifornia.

13. Todd. I.R.(1990): Lecture Notes in immunology, Blackwell Scientific Publications Ltd. Oxford.
14. Rolt I.M. Brostoff and Male 2nd, 3rd, 4th ed. 1989, 1994, 1995 Immunology- Gower Medical Publishing Co.,
15. Fundamental Immunology- W.E. Paul. 1989, Raven Press, New York.
16. Fundamentals of immunology –R.M.Coleman, M.F. Lombord and R.E. Sicard(1992)-2nd
Brown Publishers.
17. Immunology-D.M. Weir and Steward 7th Ed.(1993)