



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

**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)

UNIT I

SOLID STATE PHYSICS

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

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

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.

Super Conductivity: 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-Nuttal 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 Pyrhilometer, and Pyronometer.

(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

Introduction, Classification of liquid crystals, Display system, Introduction to conducting polymers and applications .

Problems

(6 + 1= 07 Hrs.)

Physics Lab 6.2: Lab VII

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)**

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, 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

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).

2. GEOLOGY

B.Sc (GEOLOGY OPTIONAL) SEMESTER VI

Code: 14BSCGEOLT61

(Paper I: HYDROGEOLOGY & GEOPHYSICS)

Max. Marks: 80

Total teaching hours: 50 (4 hrs/week)

UNIT	TOPIC	Hrs
I	HYDROGEOLOGY: Definition. Hydrological Cycle- Evaporation, transpiration, evapotranspiration, precipitation, sublimation, infiltration, runoff, groundwater flow.	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.	10
	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.	
IV	Wells and types of wells- dug well and bore well. Rainwater harvesting; and Groundwater recharge structures	10
V	GEOPHYSICS: Earth's magnetic and gravitational fields. General principles and applications of - Magnetic methods, gravity method, electrical methods (direct current resistivity methods), vertical electrical soundings; and Seismic method.	10

B.Sc (GEOLOGY OPTIONAL) SEMESTER VI

Code: 14BSCGEOLP61

(PAPER I: HYDROGEOLOGY & GEOPHYSICS)

Max. Marks: 40

Time: 4 hrs/week

Total 50 hrs

- i. Water chemistry problems: Based on given data calculate-Na/RSC/SAR and draw Pie/Bar/Stiff diagrams and comment on the suitability of the water.
- ii. Basin Analysis, morphometric analysis using Drainage patterns.
- iii. Resistivity Meter (Only for demonstration). Vertical electrical soundings, Plotting of the given resistivity data and interpretation.
- iv. Interpretation of subsurface features from the given Seismic profiles.
- v. Preparation and interpretation of water table maps from the given data.

TEXT BOOKS

1. Groundwater - By Todd D. K., John Wiley and Sons.
2. Groundwater - By K. V. Karanth,
3. Groundwater and Tubewells - 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. Rangunath, 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. Exploration Geophysics- Gadallah Mamdouh R., Fisher, Ray
11. Modern Geophysics In Engineering Geology- D. M. McCann, M. Eddleston, P. J. Fenning and G. M. Reeves

B.Sc (GEOLOGY OPTIONAL) SEMESTER VI

14BSCGEOLT62

(Paper II: REMOTE SENSING & ENGINEERING GEOLOGY)

Max. Marks: 80

Total teaching hours: 50 (4 hrs/week)

UNIT	TOPIC	Hrs
I	REMOTE SENSING 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.	10
V	ENGINEERING GEOLOGY 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.	10

PRACTICALS

Code: 14BSCGEOLP62

Paper II- REMOTE SENSING & ENGINEERING GEOLOGY PROBLEMS

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.
 - iii. Identification of dam/tunnel sites using the given geological maps.

TEXT BOOKS

1. An introduction to mining- Methun. Thamus, P.J. 1979
2. Mining Geology, New York- Mc Kinstry, H.E 1960
3. Mining Geology- Forrester
4. Courses in Mining Geology – Oxford & IBH, New Delhi. Arogyaswamy, R.N.P.
5. Engineering Geology- Parbin Singh
6. Engineering Geology- F.C.Bell
7. Principles of Engineering Geology - Bangar
8. Aerial Photographic interpretation and applications- D.R.Leudar
9. Manual of photogrammetry - M.Thomson,Ed
10. Manual of Remote Sensing - R.G.Reeves, Ed
11. Remote Sensing in Geology- P.S.Siegal & A.R.Gillespie
12. Text book of Remote Sensing and Geographical information systems - M.Anji Reddy
13. Photogeology and Regional Mapping - By J. A. E. Allum, Pergamon Press.
14. Principles and Applications of Photogeology - By S. N. Pandey.
15. Photogeology - By Victor C. Miller, Mc Graw Hill Book Co.Inc.
16. Remote Sensing- Principles and Interpretation - By F. F. Sabins,
17. Remote sensing and image interpretation. John Wiley & Sons -T.M and R.W. Kiefer.
18. Photogeology. McGraw-Hill Publishers, New York -Miller, V.C
19. Photogeology and regional mapping- Oxford- Allum, J.A.E (1978).
20. Handbook of aerial photography and interpretation- Rampal, K.K (1999).
21. Remote sensing and its application. Universities Press Ltd., Hyderabad-Narayan, L.R.A (1999).

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 Harmones

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 etal.

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(d₁ to d₁₀ 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-d₁ and d₂ states, discussion of the electronic spectrum of [Ti(H₂O)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 | Wilard martin and Dean |
| 02. Instrumental methods of chemical analysis | H. Kour. |
| 03. Quantitative Inorganic analysis | A.I. Vogel |

Books recommended for organic chemistry:

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

Books recommended for physical chemistry:

- | | |
|------------------------|-----------------|
| 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-Lambert's 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)

B. Sc. SEMESTER – VI

Electronics (Optional) 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, ground station (simplified Block diagram of earth station). Multiple access methods -TDMA, FDMA, CDMA, GPS-service's like SPS & PPS.

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

REFERNCE 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

**Electronics (Optional)
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, block diagram of Computer system, central processing unit (CPU) , ALU ,CU , main memory , Secondary memory, brief introduction of history of computer generations.

Hardware: Input devices (Key board , mouse and scanner).
Output devices (various types of printers).Secondary storage devices (CD-ROM, optical disk).

Software : System software , operating system & application software. Machine Language, Assembly Language & High Level Language. Assembler, compiler and editor. Algorithm, Characteristics of an algorithm and flow charts.
8Hrs.+2Hrs.Problems =10hrs

UNIT - II: INTRODUCTION TO C-PROGRAMMING:

Characteristics of C language, Applications of C. Basic Structure of C program, Execution of C. C tokens, key words, identifiers, Constants, Variables and data types. Declaration of variables, assigning values to variables, defining symbolic constants. Operators and expressions (All type), conditional operator.
8Hrs.+2Hrs.Problems =10hrs

UNIT -III : DECISION MAKING & BRANCHING

Conditional & control statements: if statement, if-else statement, Nested if statement, Switch statement and goto- statement. Loop control structures: while,

do-while and for statements. Break and continue statements.

8Hrs. +2Hrs.Problems =10hrs

UNIT -IV : ARRAY AND STRING HANDLING PROGRAMS:

One and two dimensional arrays, Declaration and initialization of arrays, multidimensional arrays.

Strings, Declaring and initializing of 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

REFERNCE BOOKS:-

1. Theory and Problems of programming with C - Schaum's series -Byron S.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. 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.

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	04	40	10*	50	4 hours
Field Work and Dissertation						

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. Karenavar & S. S. Nanjannavar: Practical Geography.
7. M .F. Karenavar & S. S. Nanjannavar: Practical Geography (Kannada Version)
9. Pijushkanti Saha & Partha Basu: Advanced Practical Geography

6. BIOTECHNOLOGY (Optional)

SEMESTER-VI

PAPER 6.1: INDUSTRIAL AND ENVIRONMENTAL BIOTECHNOLOGY

Total hour allotted – 60 Hrs.

PART A: INDUSTRIAL BIOTECHNOLOGY

1. Introduction to industrial biotechnology, Basic principle of fermentation technology.
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.
3. Screening & isolation of industrially important microorganisms
4. **Downstream process:** Introduction, removal of microbial & other solid matter, Foam separation, filtration, centrifugation and application
5. **Fermentation media:**
Natural and synthetic media, Sterilization techniques- Heat, Radiation, and filtration methods.
6. **Production of microbial products:**
Lactic acid, Alcohol, penicillin & amylase.
7. **Fermented foods:**
Fermented foods-Yoghurt, Buttermilk, Dosa, cheese, Tempeh
Microbial foods-Single cell protein (SCP) and single cell oils (SCO).
8. **Plant cell suspension culture for the production of food additives:**
Saffron and capsaicin and shikonin.
9. **Technique of mass culture of algae:** *Spirulina*.
10. Microbial polysaccharides and polyesters; production of xanthan gum and Polyhydroxy alkanoids (PHA).

PART B: ENVIRONMENTAL BIOTECHNOLOGY

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

PRACTICAL 6.2 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. Pvt

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, New Delhi
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.Grabiel 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, New
York.
- 14.Sinha R.K. 1997: Global Biodiversity, INA, Shree Publishers, Jaipur.

PAPER 6.3 AGRICULTURAL AND MEDICAL BIOTECHNOLOGY

Total hours allotted: 60

PART A - AGRICULTURAL BIOTECHNOLOGY

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

PART B- MEDICAL BIOTECHNOLOGY

1. Introduction and scope of medical biotechnology.
2. **Vaccines:**
Production of Bacterial and Viral vaccines, recombinant vaccines and its Production (FMDV) and gene vaccines.
3. **Enzymes used in Diagnosis:** Immobilized enzymes.
4. **Enzymes in Therapy:**
Important enzymes and their therapeutic applications.
5. Insulin production by recombinant DNA technology.
6. **Therapeutic proteins:**
Important proteins and their therapeutic applications- Somatotropin, Cytokines, Interleukin, Interferon, Human Factor-VIII and IX.

7. Hybridoma Technology:

Production of monoclonal antibodies and their applications.

8. Human Gene Therapy:

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.**10. Bioforming:** Production of biopharmaceuticals in plants and animal tissues.**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.

Reference:**Agricultural Biotechnology:**

Chatwal G.R.1995: Text Book of Biotechnology, Anmol Pub. Pvt.Ltd.

Chrispeel M.J. and Sdava D.E.1994, Plant Genes and Agriculture, Jones and Barlett Publishers, Boston.

Cruger W and Cruger A.: Biotechnology- A text book of Industrial Microbiology, 2nd edn.

Gamborg and Phillips 1996: Plant Cell, tissue and organ culture: Fundamental methods, Narosa Pub.

Gupta .P.K.1996: Elements of Biotechnology, Rasotagi and company.

Ignacimuthu S. 1996: Applied Plant Biotechnology.

Natesh S, Chopra. V.L and Ramachandra S. 1994: Biotechnology in Agriculture, Oxford and IBM Publ Co. Pvt. Ltd., New Delhi.

Prakash M and Arora C.K.1998: Cell and Tissue Culture, New Delhi

Razdan M.K.1993: An introduction to Plant Biotechnology.

Singh B D.2006: Biotechnology, kalyani publishers, Ludhiana.

Plant Biotechnology & Molecular Markers (2004) Shrivastava *et al*
Agricultural Biotechnology (1998) Altman, A.

Plant Biotechnology: The Genetic Manipulation of Plant (2004) Adrianstater *et* Legal Aspect
of Gene Technology (2004) Brian, C.

The GMO Hand Book: Genetically Modified Animals, Microbes & Plant (2004) Sarad, R.P.

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)

B.Sc. VI Semester

(w.e.f 2016-17)

Botany paper- I

50 Hrs

Objectives: This paper has topics on Cell Biology, Genetics and Evolution to study the fundamental units of heredity and variations.

Unit 1 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 2: Morphology of Chromosomes: Number, size, shape, types, centromere, SAT-chromosomes, Ultra structure of giant Chromosomes, Ploidy and chromosomal aberrations.

06 Hrs.

Unit 3: Cell division: Mitosis and Meiosis. **Cell cycle:** regulation of cell cycle. 06 Hrs.

Unit 4: 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 5: 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 -

1. Benjamin Lewen – Gene VI & VII – New York Oxford University Press, USA.

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 |

B.Sc VI Semester Practical Examination

Subject: Botany Paper- I

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 (onion peeling cells or any permanent slide of algal specimen. Calibration-3 marks, diagram-1 mark, measurement of length and breadth -2 marks) | |
| | | 6 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 1: Cell Biology: 02 sub questions.

From Unit 2: Morphology of Chromosomes: 02 sub questions.

From Unit 3: Cell division: 02 sub questions.

From Unit 4: Genetics: 05 sub questions.

From Unit 5: Evolution: 01 sub question.

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

6X 5 = 30

From Unit 1: Cell Biology: 02 sub questions.

From Unit 2: Morphology of Chromosomes: 01 sub question.

From Unit 3: Cell division: 01 sub question.

From Unit 4: Genetics: 03 sub questions.

From Unit 5: Evolution: 01 sub question.

Q. III Descriptive Answers

21. From Unit 1: Cell Biology: 01 sub question. 1 X 10 = 10

OR

From Unit 2: Morphology of Chromosomes-01 sub question.

22. From Unit 3: Cell division: 01 sub question. 1 X 10 = 10

OR

From Unit 4: Genetics: 01 sub question.

23. From Unit 4: Genetics: 01 sub questions. 1 X 10 = 10

OR

From Unit 5: Evolution: 01 sub question.

B.Sc VI semester

(w.e.f 2016 -17)

Botany paper -II

(Molecular Biology, Biotechnology & Immunology)

50 hrs

Objectives: - Molecular Biology, Biotechnology and Immunology has some recent trends in the concern fields. This will help students to pursue research in concerned fields.

Unit 1: Nucleic Acids: 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.

10 Hrs.

Unit 2: Gene Expression: Gene concept, Genetic code & protein synthesis. Regulation of gene expression in prokaryotes & eukaryotes.

08Hrs.

Unit 3: Recombinant DNA technology and Bioinformatics:

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.

08 Hrs.

Unit 4: Biotechnology and Genetic engineering of plants:

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.

12Hrs.

Unit 5: Microbial genetic manipulation and Immunology:

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.

12 Hrs.

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 Azatobacteria-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 Kristianses -- 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 Easterbs, New Delhi.
6. Roitt- Immunology
7. Kubey – Immunology.
8. Fatima – Immunology

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 |

B.Sc VI Semester Practical Examination

Subject: Botany Paper- I

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 – II

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 1: Nucleic Acids: 02 sub questions.

From Unit 2: Gene Expression: 02 sub questions.

From Unit 3: Recombinant DNA technology and Bioinformatics: 02 sub questions.

From Unit 4: Biotechnology and Genetic engineering of plants: 03 sub questions.

From Unit 5: 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 1: Nucleic Acids: 02 sub questions.

From Unit 2: Gene Expression: 01 sub question.

From Unit 3: Recombinant DNA technology and Bioinformatics: 02 sub questions.

From Unit 4: Biotechnology and Genetic engineering of plants: 02 sub questions.

From Unit 5: Microbial genetic manipulation and Immunology: 01 sub question.

Q. III Descriptive Answers.

21. From Unit 1: Nucleic Acids: 01 sub question.

1 X 10 = 10

OR

From Unit 1: Nucleic Acids: 01 sub question.

22. From Unit 2: Gene Expression: 01 sub question.

1 X 10 = 10

OR

From Unit 3: Recombinant DNA technology and Bioinformatics: 01 sub question.

23. From Unit 4: Biotechnology and Genetic engineering of plants: 01 sub question.

1 X 10 = 10

OR

From Unit 5: Microbial genetic manipulation and Immunology: 01 sub question.

9. COMPUTER SCIENCE (OPTIONAL)

B.Sc. Semester – VI

COMPUTER SCIENCE (Optional)

(w. e. f 2014-15 onwards)

14BSCCSCT61 : Computer Networks (Paper – I) Total : 50 Hrs

Unit 1:

Introduction: Computer Networks and its applications, Network structure, network architecture, Topologies, LAN, WAN, MAN, The OSI reference model, The TCP/IP reference model, services - SMDS, Frame relay, network standards, example networks, **The Physical Layer:** Transmission Media – Twisted pair, coaxial cable, optical fiber, radio transmission, microwaves and infrared transmission, Switching – message switching Circuit switching, packet switching **10 Hrs**

Unit 2:

The Data Link Layer: Data Link Layer design issues, Error detection – Single parity checking, polynomial codes – CRC, Error correction- Hamming code, Elementary data link protocols, sliding window protocols, Example data link protocols. **10 Hrs**

Unit 3:

The Medium Access Control: The channel allocation problem, multiple access protocols – ALOHA, Slotted ALOHA, CSMA protocols, Collision free protocols, Ethernet, Wireless LAN, Bluetooth. **10 Hrs**

Unit 4:

The network Layer: Network layer design issues, Routing algorithms – Flooding, Distance vector routing , Hierarchical routing, Link state routing, Congestion control algorithms – Leaky bucket, token bucket algorithm, admission control, hop by hop choke packets , Quality of Service. **10 Hrs**

Unit 5:

The Transport Layer and Application Layer: Transport service, Elements of Transport protocols, Internet transport protocols (TCP & UDP), DNS, Electronic Mailing, and World Wide Web. **10 Hrs**

TEXT BOOKS:

1. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, Fifth Edition, Pearson Pub. 2012.

References:

1. Ulyses Black, Computer Networks: Protocols, standard and interfaces, PHI.
2. James Martin, Local Area Networks: Architecture and implementation, PHI.
3. Behrouz Foruzan, Data Communication and Networking. TMH.
4. W. Stallings, Data and Computer Communications, Pearson Education.
5. Prakash Gupta, Data Communications, PHI.
6. James F. Kurose & Keith W. Ross, Computer Networking A TOP DOWN Approach Featuring the Internet, 2nd Edition, Pearson Education.

14BSCCSCP62 : Computer Networks Lab – B.Sc. Semester - VI

- 1) Programs using TCP Sockets (like date and time server & client, echo server & Client, etc...)
- 2) Programs using UDP Sockets (like simple DNS)
- 3) Programs using raw sockets (like packet capturing and filtering)
- 4) Programs using RPC
- 5) Simulation of sliding window protocols
- 6) Experiments using simulators (like OPNET)
- 7) Performance comparison of MAC protocols
- 8) Performance comparison of Routing protocols
- 9) Study of TCP/UDP performance

**Syllabus for B.Sc. Semester – VI
COMPUTER SCIENCE (Optional)**

14BSCCSCT63 : Core Java (Paper – II)

Total : 50 Hrs

Unit 1:

Introduction: Internet origin and development – internet architecture frame work world wide web. **Introduction to JAVA:** JAVA Evolution, Java History, Java features, How java differs from C and C++, Java and Internet, Java and World Wide Web. Web Browsers, Hardware and Software requirements, Java support system, Java Environment. Overview of JAVA Language: Introduction, Simple Java Program, More of Java, An Application with Two Classes Java Program structure, Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Programming Style. Constants, Variables and Data Types: Introduction, Constants, Variables, Data Types, Declaration of Variables, Giving Values to Variables, Scope of variables, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values, Operators and Expressions; Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Bitwise Operators, Special Operators, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic Operators, Type conversion and Associatively, Mathematical Functions. Decision Making and Branching: Introduction, Decision making with if Statement, Simple if Statement, The if..... else Statement, Nesting of if..... else Statement, The else if Ladder, The Switch Statement, The ?: Operator. Decision Making and Looping: Introduction. The while Statement, The do Statement, The for Statement, Jumps in Loops Labeled Loops. **12 Hrs**

Unit 2:

Classes, Arrays, Strings and Vectors: Classes, Objects and Methods: Introduction, Defining a Class, Adding Variables, Adding methods, Creating Objects, Accessing Class members, Constructors, Methods Overloading, Static members, nesting of Methods, Inheritance: Extending a Class Overriding Methods, Final Variables and methods, Finalizer methods, Abstract methods and Classes, Visibility Control. Arrays, Strings and Vectors: Arrays, One – Dimensional Arrays, Creating an Array, Two – dimensional Arrays, Strings, Vectors, Wrapper Classes. **10 Hrs**

Unit 3:

Interfaces, Packages and Multithreaded Programming: **Interfaces:** Multiple Inheritance: Introduction, Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variable. **Packages:** Putting Classes together: Introduction, Java API Package, Using System Packages, Naming Conventions, Creating Packages, Accessing a Packages, Using a Packages, Adding a Class to a Package, Hiding Classes. **Multithreaded Programming:** Introduction, Creating Threads, Extending the Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the ‘Runnable’ Interface. **10 Hrs**

Unit 4:**Managing Exceptions, Applet Programming: Managing Errors and Exception:**

Introduction, Types of Errors, Exceptions, Syntax of Exception handling Code, Multiple Catch Statements, Using Finally Statement, Throwing Our Own Exceptions, Using Exceptions for Debugging. Applet Programming: Introduction, how Applets Differ from Applications, Preparing to Write Applets, Building Applet Code, Applet Life Cycle, Creating an Executable applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, running the Applet, More about Applet Tag, Passing Parameters to Applets, Aligning the Display, More About HTML Tags, Displaying Numerical Values, Getting Input from the User. **12 Hrs**

Unit 5:**Graphics Programming, Input / Output: Graphics Programming:**

Introduction, The Graphics Class, Lines and rectangles, circles and Ellipses, Drawing Arcs, Drawing Polygons, Line Graphs, Using Control Loops in Applets, Drawing Bar Charts. **Managing Input / Output in JAVA:** Introduction, Concept of Streams, Stream Classes, Byte Stream Classes, Character Stream Classes, Using Streams. Other Useful I/O Classes, Using the File Class, Input / Output Exceptions, Creation of Files, Reading/Writing Characters, Reading/Writing Bytes, handling Primitive Data Types, Concatenating and Buffering Files, Interactive Input and Output, Other Stream Classes. **8 Hrs**

TEXT BOOKS:

1. E. Balaguruswamy, Programming with JAVA, A Primer, 4th Edition., TMH (1999), (Chapter 2 – 16)
2. Shishir Gundavaram, CGI Programming on the “World Wide Web, O’Reilly and Associates, (1996). (Chapter 1)

References:

1. Thomas Boutel, CGI programming in C and Perl, Addison – Wesley(1996).
2. Jeffrey Dwight et al, Using CGI,(second Edition), Prentice Hall, India, (1997).
3. Darrel Ince and Adam Freeman, Programming the Internet with Java, Addison Wesley, (1997).
4. Ken Arnold and James Gosling, the Java Programming Language, Addison – Welsey (1998).
5. Patrick Naughton and Herbert Schildt, JAVA 2: The Complete Reference, 3rd Edition, TMH,(1999).

14BSCCSCP64 : Core Java Lab – B.Sc. Semester - VI

Java Programming LAB

Sample programs

1. Program to calculate the distance travelled by light in 100 years
2. Program to demonstrate dynamic initialization
3. Program to find prime series up to n by accepting the limit from user from command line arguments.
4. Program to demonstrate the use of all iterative and jump statements.
5. Program to implement thread, applet and graphics by implementing animation of ball moving.

Journal programs

1. Program to demonstrate typecasting and type promotions in java.
2. Program to implement all bitwise operations by reading the input by user and display input and output errors.
3. Program to demonstrate method overloading.
4. Program to implement at least 10 string operations on Strings.
5. Program to demonstrate multilevel inheritance. Show the usage of super ().
6. Program to demonstrate method overriding and dynamic method dispatch.
7. Program to demonstrate constructor overloading by passing different number of parameters of different types.
8. Program to demonstrate a) Packages b) Interfaces.
9. Program to illustrate the usage of try, catch, throws and finally to show exception handling in java.
10. Program to show thread synchronization by creating threads using runnable interface.
11. Program to demonstrate thread priorities. Create the thread by extending thread class.
12. Program to create student report using applet, read the input using text boxes and generate the grades.
13. Program to demonstrate a) Abstract class b) Inner class
14. Program to demonstrate drawing bar chart in applets using graphics programming.
15. Program to copy bytes from one file to another.
16. Program to implement mouse events.

Practical Examination

Evaluation criteria for practical examinations shall be as follows:

1. Writing of Programs -15 Marks

- a. One program from the journal list – 08 Marks
- b. Another program given by examiner based on the concepts studied -07Marks

2. Execution of programs – 15 Marks

a. Journal Program - 08 Marks

b. Program of Examiner's Choice -07 Marks

2. Viva-Voce -05 Marks

4. Journal / Laboratory Report – 5 Marks

Total Marks -40 Marks

COMPUTER SCIENCE (Optional)

QUESTION PAPER PATTERN FOR ALL SEMESTER

THEORY PAPERS :

Question paper has to be set for total marks of 80.

Section–A: Ten questions to be answered out of twelve each carry 2 marks

$$2 \times 10 = 20$$

Note: Two questions to be set from each unit, and last two questions from any unit.

Section–B: Five questions to be answered out of seven each carry 4 marks $4 \times 5 = 20$

Section–C: Four questions to be answered out of six each carry 10 marks

$$10 \times 4 = 40$$

$$\text{Total Marks} = 80$$

Practical Examination

Evaluation criteria for practical examinations shall be as follows:

1. Writing of Programs -15 Marks

- a. One program from the journal list – 08 Marks
- b. Another program given by examiner based on the concepts studied -07Marks

2. Execution of programs – 15 Marks

- a. Journal Program - 08 Marks
- b. Program of Examiner's Choice -07 Marks

3. Viva-Voce -05 Marks

4. Journal / Laboratory Report – 5 Marks

Total Marks -40 Marks

COMPUTER SCIENCE (Optional)
QUESTION PAPER PATTERN FOR ALL SEMESTER
(w. e. f 2014-15 onwards)

Time : 3 Hours]

[Max. Marks: 80

Section A

Answer any ten questions, each carries two marks. $2 \times 10 = 20$

- 1)
- 2)
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)
- 10)
- 11)
- 12)

Section B

Answer any five questions, each carries 4 marks. $4 \times 5 = 20$

- 13)
- 14)
- 15)
- 16)
- 17)
- 18)
- 19)

Section C

Answer any four questions, each carries 10 marks. $10 \times 4 = 40$

- 20)
- 21)
- 22)
- 23)
- 24)
- 25)

10. STATISTICS (OPTIONAL)

B.A/ B.Sc. COURSE IN STATISTICS (OPTIONAL) SIXTH SEMESTER THEORY PAPER-I

With effect from 2016-17

Total: 50 Hours.

STTH-6.1: 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 & 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. & 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

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

STTH-6.2: 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.

11. ZOOLOGY (OPTIONAL)

BSc – Zoology (Optional) Sixth Semester

Paper 6.1 and 6.2 Outline

STRUCTURE

Semester	Syllabus	Hour's
Paper I	APPLIED ZOOLOGY, Sericulture Apiculture, Insect pest management. Vermiculture, Aquaculture, Poultry breeds, Animal Husbandry and Lac culture	50
VI Paper-II	Microbiology, Nanotechnology, Bioinformatics and Methods in Biology	50

Rani Channamma University, Belagavi
B.Sc VI Semester _ 6.1

Paper I

Total hours – 50
Marks _ 80
Theory 4 hrs/week

APPLIED ZOOLOGY (optional)

Sericulture : Mulberry Silkworm and Life History of Bombyx mori
07 hrs

Rearing of Silkworm: Grainage management, Emergence of moth and fertilization, egg laying, hatching and moulting of-silkworm, spinning of cocoons, Cocoon processing, stiffling and spinning silk. Filature. Non mulberry silkwarm, types. in brief & Silkworm diseases- Muscardine, Grasserie, Flacherie & Pebrine.

Apiculture: Species of Honey Bees, their Social organization, Life History
05 hrs
Methods of Bee Keeping, products of Bees, & their Economic importance

Insect Pest Management : Natural control and Applied control of pests
05 hrs
Applied Control ___ Mechanical, Physical, Cultural, Legal, Chemical control

Vermiculture: Eerthworm species used in vermiculture,vermiculture technique,and Importance of vermiculture.
04 hrs

Aquaculture :
10 hrs
Prawn Fisheries, Species of Prawns, Culture of freshwater and marine Prawns, Preservation and processing of Prawns.

Pearl Culture : Pearl producing molluscans, Pearl formation, Pearl producing Sites in India. Quality and composition of Pearl.
Pearl Industry:Artificial Insertion of nucleus
Brief technique of Fish culture, Preservation of fishes and their Byproducts

Poultry : Breeds of fowl, Diseases of poultry, Poultry maintenance and By-products, and CoMposition and Nutritive value of Egg.

06 hrs

Animal Husbandary: Maintenance, Breeds Diseases, Products and By Products of the following

10 hrs

Sheep and Goats, Cow and Buffalos, Composition and Nutritive value of Milk

Lac culture: Classification of Lac insect (Techardia lacca, Life history of Lac

Insect. Host plants, Cultivation of Lac. Compostion and properties & Economic importance

3 hrs.

**Practicals – 6.1
Practicals**

Total -11

- | | |
|--|---|
| 1. Project on any of the applied branch studied in theory | 1 |
| 2. Study of mulberry silkworm and Life cycle | 1 |
| 3. Types of non mulberry silkworms in brief and Silkworm diseases (Pebrine, Muscardine and Grasserie & Flaturie) | 1 |
| 4. Species and castes of honeybees | 1 |
| 5. Agricultural pests and domestic pests (total 8 varieties) | 1 |
| 6. Study of fisheries __ Molluscs (three), Crustaceans (three) And Pisces (six) | 1 |
| 7. Study of Varieties of sheep and goat (from chart/photographs) | 1 |
| 8. Study of varieties of Cow & Buffalos(from chart/photographs) | 1 |
| 9. Vermiculture__ Study of types of Earthworm species | 1 |
| 10 Study of poultry breeds | 1 |
| 11 Study of Lac insect (Life cycle) | 1 |

Scheme for practicals 6.1 APPLIED ZOOLOGY

Q No. I	Sericulture	03 marks
Q No. II	Apiculture	03 marks
Q No. III	Pest management	03 marks
Q No. IV	Pisciculture	03 marks
Q No. V	Vermiculture	03 marks
Q No. VI	Animal Husbandry	06 marks
Q No. VII	Prawn & Pearl culture	04 marks
Q No. VIII	Project report & Viva	10 marks
Q No. IX	Journal	05 marks

Total 40 marks

Note 1 :Examiners can alter the Scheme of marks for practical in consultation With the staff of the host college.

Note 2 : Theory	Internal	20 marks
	Final	80 marks
Practical	Internal	10 marks
	Final	40 marks

Note 3 : Question paper pattern for THEORY examination

Q No. I marks	02 marks	10* 02	= 20
Q No. II marks	05 marks	06* 05	= 30
Q No. III marks	10 marks	01* 10	= 10
Q No. IV marks	10 marks	01* 10	= 10
Q No. V marks	10 marks	01* 10	= 10

Note 4 : Q Nos IIIrd IV & V each should have one internal option

B.Sc VI Semester _ 6.2

Paper II (Microbiology, Nanotechnology, Bioinformatics and Methods in Biology)

Total hours – 50
Marks _ 80
Theory 4 hrs/week

Microbiology

1. **Microscopy** : Compound Microscope and its functions 03 hrs
Dark field microscope. Fluorescent Microscope
Phase Contrast Microscope and Electron Microscope and their uses
2. **Sterilization and other Techniques** _ Physical and Chemical methods 01 hr
Bacteria: Classification based on shapes, structure (anatomy)
Bacterial reproduction and growth. 02 hrs
3. **Virus** _ Morphology, chemical properties, classification and nomenclature 02 hrs
DNA and RNA viruses.
4. **Fungi**: Structure, classification and reproduction, Yeasts 02hrs
5. **Fermentation**: Types of Fermentor and basic functions 03hrs
Methods of preservations and criteria for the selection of microorganisms
6. **Production of antibodies** Penicillin, Streptomycin, Enzyme protease, Riboflavin. 02hr
7. Normal microbial flora of the human body 01hr
8. Role of microbes in environment 01hr

Nanotechnology

4hrs

Introduction : History, Name, Tools and Techniques in Nanotechnology.

Nanobiology; application of Nano in biology- Nano drug Administration Diagnostic & Therapeutic applications. Lotus effect, Gold & Silver Nanotechnology. Curcumin phytochemicals, Cinnamon in green nano technology.

Bioinformatics

1. Introduction : Definition, Goal of Bioinformatics, Sequencing-Sequences analysis and Structure analysis
Applications of Bioinformatics. 02hrs

2. Classification of Biological Data Bases. Characteristics of FASTA (FastAlignment) BLAST (Basic Local Alignment Search Tool). 02hrs

3. Aims and goals of Human Genome Project: Main findings of human genome Project., Prediction and tools for gene prediction. Comparative genomics. 02hrs

4. Proteomics: Two dimensional Gel Electrophoresis
Mass spectrometry, SDS __ PAGE
Structure of protein __ Primary, Secondary, Tertiary and Quaternary. 02hrs

Protein structure prediction 01hr

Application of Proteome analysis

The future of Proteomics 01hr

Methods in Biology

Techniques of Cell fraction and Centrifugation.

Homogenization and cell tissue disruption

Centrifugation, Ultra centrifugation. 02hrs

DNA Sequencing, __ In situ Hybridization, DNA microchips 02hrs

Genetic Engineering in animals- Transgenic Mouse, Transgenic sheep, Genetically Altered Fish. Mosquito and Drosophila. 02hrs

Gene therapy in Humans 02hr

Histochemical and Immunization Techniques _ ELISA, RIA, Flow Cytometry 02hrs

Nucleic Acid Blotting and their applications _ Southern Blotting, Northern Blotting, Western Blotting 02hrs

Biophysical Methods _ Brief note of NMR, ESR, Spectroscopy and their uses 02hrs

Radioisotopes Techniques in Biochemistry - Types of radioactive decay- Alpha, Beta emission & Gamma rays 01 hr

Geiger-Muller counter, Liquid Scintillator 01hr

Biological applications of Radioisotopes 01hr

A brief note on the use of **ECG, PET, MRI, CAT**. Single Neuron recorder in Electro Physiological methods 02hrs

B.Sc VI SEMESTER 6.2

PRACTICAL DETAILS

ZOOLOGY Pract-II

TOTAL 11 PRACTICALS

Measurement of micro organisms (Micrometry)

Preparation of liquid medium (Broth)

Preparation of solid media (PDA medium and PDA plates)

Preparation of agar slants.

Bacterial cell counting using haemocytometer.

Simple and Grams's staining differentiation of bacteria.

Isolation, Identification and enumeration of Bacteria/Protozoa from moist soil or sewage water

Practical application of Bioinformatics: Tool BLAST And FASTA to find out sequence of nucleotides in Desired gene/Amino acid in desired protein

Study of Microbiological Lab Equipments—
Microscope, Centrifuge, Autoclave, Pressure cooker, Laminar air flow, Streak Plate, Inoculation needle etc.

Visit to Diagnostic center to study practical application of ECG, PET, MRI, CAT

Suggestions for Practical Examination

Microbiology, Nanotechnology, Bioinformatics & Methods in Biology

SEM – VI 6.2 ZOOLOGY (OPTIONAL)

Q No. I	Microbiology Spotting (05*2)	10 marks
Q No. II	Bioinformatics	07 marks
Q No. III	Methods in Biology	07 marks
Q No. IV	Viva	05 marks
Q No. V	Visit to diagnostic center – A Report	06 marks
Q No. VI	Journal	05 marks

Note 1 : Examiners can alter the Scheme of marks for practical in consultation with the staff of the host college.

Note 2 :	Internal	20 marks
	Final	80 marks
Practical	Internal	10 marks
	Final	40 marks

Note 3 : Question paper pattern for THEORY examination

Q No. I	02 marks	10* 02	= 20 marks
Q No. II	05 marks	06* 05	=30 marks
Q No. III	10 marks	01* 10	=10 marks
Q No. IV	10 marks	01* 10	=10 marks
Q No. V	10 marks	01* 10	=10 marks

Note 4 : Q Nos III, IV & V each should have one internal option.;

. Note : TWO INTERNAL THEORY TESTS SHOULD BE CONDUCTED FOR EVERY SEMESTER

First Internal Theory TEST should be set for maximum of 20 marks for duration of

one hour & Second Internal Theory TEST should be set for maximum of 80 marks

Duration of THREE HOURS.

Note 3 : Question paper pattern for Theory examination

02 marks	10x2	=20
05 marks	6x5	=30
10 marks	3x10	=30

Note 4 : Q Nos . III, IV & V--- SHOULD have ONE internal option
OF 10 MARKS

Note : Paper setters should give due weightage to the TOPICS of the SYLLABUS

Note 5: Staff meet should be conducted to discuss the syllabus % before every semester.

All the staff members should attend the meeting compulsorily.