RANI CHANNAMMA UNIVERSITY, BELAGAVI

WEL-COME

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

V Semester

w.e.f.

Academic Year 2019-20 and onwards

1. PHYSICS (OPTIONAL)

Paper I
Physics 5.1: CLASSICAL MECHANICS, ELECTRONICS& RELATIVITY (TOTAL HOURS: 50)
17BSCPHYT51
UNIT I

CLASSICAL MECHANICS
Constraints: Types with example, Degrees of Freedom,Configuration Space, Principle of Virtual Work, Generalized Co-ordinates, Virtual displacement, Velocity, Force, Kinetic and Potential Energies (derivations) . D'Alembert's Principle, Lagrange's equation of motion from D'Alembert's Principle, Applications of Lagrange's equation of Motion.

a. Motion of a Single Particle in Cartesian Co-ordinates.

b. Simple pendulum.

Problems

(8+2= 10 Hrs.)

UNIT II

Reduction of two body problem to equivalent one body problem. Expression for the total energy, equation of orbit (equivalent of single body) and Classification of Orbits. Kepler's Laws of Planetary Motion and their derivation from Lagranges equation of motion.

Nano Physics: Length scales, Variation of physical properties from bulk to thin films to nanomaterials, - confinement of electron energy states in 0D, 1D,2D and 3D systems (qualitative treatment) ; Surface, size, shape and assembly effects.. Graphene and fullerene. Chemical Routes for Synthesis of Nanomaterials, Solvo-thermal and Sol-gel synthesis.

Problems

(8 +2 = 10Hrs.)

UNIT III
RELATIVITY
Michelson – Morley Experiment. Postulates of Special Theory of Relativity. Lorentz Transformations equations (Derivation). Relativity of Length and Time. Law of Addition of Velocities. Variation of Mass with Velocity. Mass Energy Relation. Problems

(8+2=10 Hours)

UNIT IV

ANALOG ELECTRONICS

Network theorems:

Current and voltage sources, Superposition theorem, Thevinin's and Norton's Theorem. Maximum power transfer Theorem (Derivation for all theorems).

Power supply

Unregulated bridge rectifier(efficiency, ripple factor, PIV ,TUF and Voltage regulation-qualitatively.) Filters: capacitor filter, LC filter, section filter(study of wave forms qualitatively) Zener diode : characteristics parameter, Explanation of Zener Breakdown. Zener diode used as voltage regulator using unregulated DC voltage bridge rectifier.

Problems

(8 +2 = 10 Hrs.)

UNIT V

Transistor:

h-parameters of a transistor and their determination using CE configuration. Transistor as CE amplifier with frequency response .Types of feedback, transfer gain with feedback (derivation). Oscillators.-Transistor as an oscillator, comparison between amplifier and oscillator, Classification of oscillators-damped and un-damped oscillators, oscillatory circuit, frequency of oscillatory current, essentials of a feedback LC oscillator. Hartely and Phase shift oscillators.

FET-Types, characteristics and parameters. FET as a common source amplifier (Qualitative).

Problems

(8+2 =10 Hrs.)

PHYSICS 5.2:   **LAB – V**

17BSCPHYP52
LIST OF EXPERIMENTS

1.   Thevenin's & Norton's Theorem(Ladder Network).
2.   h-parameters of a transistor using DC source.
3.   Power supply using bridge rectifier (internal resistance and voltage regulation)
4.   Power supply using bridge rectifier with Pi– section filters (internal resistance and voltage regulation)
5.   Zener diode as voltage regulator using bridge rectifier power supply.
6.   Transistor as CE amplifier.
7.   Phase –shift oscillator using transistor.
8.   Hartley oscillator using transistor.
9.   FET-static characteristics and parameters.
10.   FET-as common sources amplifier.

   NOTE:

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

REFERENCE BOOKS:

1. Classical Mechanics – Goldstein.

2. Classical Mechanics – Gupta, Kumar and Sharma.

3. Classical Mechanics – Takwale and Puranik.

4. Modern Physics – Murugeshan.

5. Introduction to Relativity – R. Resnick.

6. Relativistic Mechanics – Gupta, Kumar.

7. Modern Physics – Duggal and Chabra.
8. Integrated Electronics – Millman and Halkiias
9. Electronics and devices and circuits – Allan Mottershed

10. Basic Electronics –B L Theraj

11. Hand book of Electronics- Gupta and Kumar

12. Principles of Electronics-V,K,Mehta

13. Handbook on Nanophysics-John D Miler

14. Nanotechnology: principles & practices-S.K.Kulkani

15. Introduction to Nanotechonology-C.P.Poole and F.J.Ownes

B.Sc. V Semester
PHYSICS (Optional)
Paper II

Physics 5.3: QUANTUM MECHANICS AND SPECTROSCOPY (Total Hours : 50)
17BSCPHYT53
UNIT I

QUANTUM MECHANICS:

Compton effect-(qualitative), Devission and Germer Experiment, de-Broglie Hypothesis. G. P. Thomson experiment, Uncertainty principle Statement, Illustration by Gamma r ay Microscope.

LASERS**:**

Stimulated Absorption and Emission, Einstein A and B coefficients. Conditions for LASER action, Gas LASER He – Ne, Diode LASER, Characters and applications of LASER.

Problems

(4+5+1=10 Hrs.)

UNIT II

WAVE MECHANICS: Time independent Schrodinger's wave equation (derivation) Physical significance of wave function. Derivation of expression for energy of a particle in a box. Eigen function and Eigen values. Linear harmonic oscillator with energy expression (derivation). Concept of zero point energy and degeneracy.

Problems

(8+2 = 10Hrs.)

UNIT III

ATOMIC SPECTRA

Vector atom model- electron spin and quantization and quantum numbers. Stern Gerlach experiments. Coupling scheme for single valance and two valance systems. Magnetic field effect on light. Magnetic moment of electron due to orbital motion.

Larmor precession. Normal Zeeman effect, explanation of experimental setup Quantum theory of normal Zeeman effect. Energy level diagram for sodium D lines. Anomalous Zeeman effect (qualitative). Lande's g_factor. Energy level diagram for Sodium D lines.

Problems

(8+2= 10 Hrs.)

UNIT IV

MOLECULAR SPECTRA AND LASERS
Spectra of diatomic molecules:
Nature of Molecular spectrum, Different types of energies of a molecule, Diatomic molecule as a Rigid Rotator. Derivation of expression for Rotational Energy of a Diatomic molecule. Application of Molecular spectra, Energy of a Diatomic molecule as a non rigid rotator (Qualitative).

RAMAN EFFECT:
Rayleigh scattering and Raman Scattering. Experimental set up for Raman effect. Raman Spectrum, Explanation of Raman effect on the basis of quantum theory. Applications of Raman Effect.
Problems

(8 + 2 =10 Hrs.)

UNIT V
MATHEMATICAL PHYSICS

LEGENDRE FUNCTIONS:
Legendre polynomials , Rodrigue's formula , generating functions and recursion relations , Orthogonality and normalization, associated Legendre functions , spherical harmonics .

BESSEL FUNCTIONS:
Bessel functions of the first kind, recursion relations, Orthogonality. Hermite fuctions ,: Hermite polynomials , generating functions , recursion relations , orthogonality.
Problems

(8+2 = 10Hrs.)

PHYSICS 5.4:   **LAB – V**
17BSCPHYP54

LIST OF EXPERIMENTS

1. Planck's constant by photo cell
2. Construction of multirange voltmeter.
3. Construction of multirange ammeter
4. Photoconductive cell
5. Astable multivibrator using transistor
6. Characteristics of G.M counter.
7. Low pass filter.
8. High pass filter.
9. Ionization potential of xenon or mercury.
10. Photovoltaic cell.

NOTE:

1. Experiments are of Four Hours duration.
2. Minimum of Eight Experiments to be performed.

REFERENCE BOOKS:

1. Modern Physics – Murugeshan.
2. Quantum Mechanics – Pauling and Wilson
3. Quantum Mechanics – B.N.Srivastava..
4. Modern Physics Vol I – B. Basavaraj.
5. Engineering physics- Basavaraj.
6. Atomic spectra – White.
7. LASERs and Non – Linear Optics – B.B.Laud.
8. Fundamentals of molecular spectra- C.NBanwell.
9. Mathematical Physics ---H. K. Dass and Dr. Rama Verma
10. Mathematical Methods for Physicists (4th Edition) George Arfken and Hans J. Weber Academic Press San Diego(1995).
11. Mathematical Physics - P.K. Chatopadhyay-Wiley Eastern Limited New Delhi (1990).
12. Introduction to mathematical Physics – Charlie Harper, Prentice-Hall of India Private Limited New-Delhi (1995)
13 Mathematical Physics - M.L.Boas

2. GEOLOGY (OPTIONAL)

SYLLABI FOR B.SC.V 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 V						
1.		STRUCTURAL GEOLOGY, GEOPHYSICS & MINING GEOLOGY	80	20*	100	3 hrs	4
		ORE PROCESSES, INDIAN MINERAL DEPOSITS & GEOCHEMISTRY	80	20*	100	3 hrs	4
2.		PRACTICAL : STRUCTURAL GEOLOGY & GEOPHYSICS	40	10**	50	4 hrs	4
		PRACTICAL: GEOCHEMISTRY & INDIAN MINERAL DEPOSITS	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).							

a) **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.

b) **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.

c) **Practical Record:** Submission of a well-maintained Journal of the Practical Work done during the semester is necessary before the Practical Examination.

d) A**ssignments**: The students will be given assignments, which are to be submitted along with the journal submission.

e) **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 l-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 V
PAPER I - STRUCTURAL GEOLOGY, GEOPHYSICS & MINING GEOLOGY

Max. Marks: 80   **Total teaching hours: 50 (4 hrs/week)**

UNIT	TOPIC	Hrs
	A. STRUCTURAL GEOLOGY	
I	**Introduction:** Stress, Strain, Rock deformation (brittle, plastic & elastic). Attitude of beds, Brunton compass and its uses.	**10**
	Outcrop: Definition, width and thickness, factors controlling the width of outcrop, Outlier and inliers.	
	Conformity and unconformity, types of unconformities- angular, disconformity, blended, non conformity, regional and local unconformity. Recognition of unconformity in the field.	
II	**Joints:** definition, classification- geometric: strike, dip, oblique and bedding joints. genetic – columnar, feather, extension and release, sheeting, rift and grain. Significance of joints.	**10**
	Folds: definition, parts of fold- limb, hinge, axis, axial plane and plunge. Types of folds- Symmetrical, asymmetrical, anticline, syncline, over turned, isoclinals, recumbent, chevron, drag, monoclinal fold. Recognition of folds in the field.	
III	**Faults**: definition, terminology- fault plane, hanging wall and foot wall, dip and hade, throw and heave. Nature of movement- translation and rotational, relative movements- Slip, strike slip, dip slip and net slip;	**10**
	Classification of Faults: Geometric – strike fault, dip fault, oblique fault; based on apparent movement – normal and reverse fault. Genetic- thrust, gravity, graben, step, ridge and trough faults. Recognition of faults in the field.	
IV	**B. GEOPHYSICS**	**10**
	Introduction: Earth's magnetic and gravitational fields.	
	General principles and applications of - Magnetic methods, gravity method, electrical methods (direct current resistivity methods), vertical electrical soundings. Interpretation of resistivity curves.	
	Seismic method – Reflection and Refraction.	
V	**C. MINING GEOLOGY**	**10**
	Introduction- Role of geology in mining industry. Definition of mining terms- shaft, hanging wall, adit, roof, drive, cross cut, tunnel, raise, winze, slopes- types.	
	Methods of mining- open cast mining (benches, explosives, working slope) and quarrying; underground/subsurface mining (stoping- open stopes, supported stopes), - Advantages and limitations.	

PRACTICAL

PAPER I: STRUCTURAL GEOLOGY & GEOPHYSICS

Max. Marks: 40   **Time: 4 hrs/week**   **Total   50 hrs**

1. Drawing of sections and writing the descriptions of the geological maps as given below (A minimum of 2 maps in each type).
   i)   Contour maps
   ii)   Horizontal strata with and without intrusions.
   iii)   Inclined strata with and without intrusions.
   iv)   Inclined strata with faults, with and without intrusions.
   v)   Maps showing unconformities with and without intrusions
   vi)   Map showing folded strata with and without intrusions.
   vii)   Maps showing combined features such as folds, faults and unconformities with and without intrusions.
2. Tracing and completion of outcrops by given data (a minimum of 5 maps)
3. Vertical electrical soundings using resistivity meter (Only for demonstration). Plotting of the given resistivity data and interpretation (4 maps).
4. Interpretation of given Seismic Profiles (4 maps).

TEXT BOOKS

1. Structural Geology - By M. P. Billings,
2. Fundamentals of Structural Geology - By N. W. GokhalE
3. Principles of structural Geology - C.M. Novin
4. Structural geology - De Sitter
5. Theory of Structural Geology- Gokhale, N.W.
6. Structural Geology – Fundamentals and Modern developments. – Ghosh. S.K
7. Structural and Tectonic, Principles- P.C. Bedgley
8. An Introduction to structural Geology - E.W. Spencer
9. Fundamentals of structural Geology- Park, P.G.
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
12. Text book of Mining Geology – R M Umathay
13. Text book of Mining Geology – James Park
14. An introduction to mining- Methun. Thamus, P.J. 1979
15. Mining Geology, New York- Mc Kinstry, H.E 1960
16. Mining Geology- Forrester
17. Courses in Mining Geology – Oxford &IBH, New Delhi. Arogyaswamy, R.N.P.
18. Engineering Geology- Parbin Singh
19. Principles of Engineering Geology - Bangar

B.Sc GEOLOGY (OPTIONAL)
SEMESTER V
PAPER II – ORE PROCESSES, INDIAN MINERAL DEPOSITS & GEOCHEMISTRY

Max. Marks: 80   **Total teaching hours: 50 (5 hrs/week)**

UNIT	TOPIC	Hrs
I	**A. ORE PROCESSES**	10
	Introduction, syngenetic and epigenetic deposits. Controls of ore deposition – Structural, stratigraphic, physical and chemical.	
	Magmatic concentration: Early (dissemination, segregation, injection) and late magmatic (residual liquid segregation and injection; and immiscible liquid segregation and injection), Sublimation. Metamorphisam and Contact metsomatism deposits.	
II	**Hydrothermal**- Epithermal, mesothermal, hypothermal, cavity filling, crustification, fissure veins (ladder vein, stocks, box work, gash veins), replacement deposits.	10
	Sedimentation Deposits: Precipitation from carbonate solution; precipitation in oxidizing environment. Features of sedimentary ore deposits. Banded Iron Formation (BIF).	
	Mechanical concentration deposits – alluvial, eluvial, eolian and beach placers (detrital/heavy minerals).	
III	**Residual deposits**- lateritisation and bauxitisation**.** **Evaporites-** salt deposits **Oxidation and supergene enrichment-** Gossan, Zone of oxidation, supergene enrichment zone and Primary zone.	10
IV	**B. INDIAN MINERAL DEPOSITS**	10
	Ore Mineral: Definition of ore mineral, ore, gangue, tenor. Introduction to metallic and non metallic ore minerals. Introduction, Mineralogy, Uses and distribution of following ore minerals in India.	
	Metallic: Iron, Manganese, Copper, Aluminium (Bauxite), Gold Medicinal use of minerals and ore minerals. **Non Metallic:** Origin of Coal, types of coal, uses and its distribution in India. Origin of Petroleum, Migration, accumulation, uses and its distribution in India	
V	**C. GEOCHEMISTRY**	10
	Introduction: Structure and atomic properties of elements. The Periodic Table. Goldschmidt's classification of the elements and distribution in the Earth – Lithophile, Siderophile, Chalcophile & Atmophile.	
	Geochemical Cycle.	
	Stability of Minerals.	

PRACTICAL

PAPER II: GEOCHEMISTRY & INDIAN MINERAL DEPOSITS

Max. Marks: 40   **Time: 4 hrs/week**   **Total   50 hrs**

1. GEOCHEMISTRY: Estimation of metal content in the given ore by volumetric method.
    i)   Calcium
    ii) Hematite
    iii) Manganese
2. Identification and physical properties of thefollowing Ore minerals: Iron- Hematite, Magnetite, Lemonite, Pyrite; Copper – Native copper, Chalcopyrite, Malachite, Azurite; Manganese – Pyrolusite, Psilomelane; Lead and Zinc – Galena, Sphalerite; Stibnite, Bauxite, Chromite, Realgar, Orpiment, Magnesite, Limestone & Dolomite.
3. Varieties of Coal- Peat, Lignite, Bituminous & Anthracite.
4. Preparation of maps showing distribution of following ore/fuel deposits in India:
    Iron, Copper, Gold, Lead & Zinc, Bauxite, Coal & Petroleum

TEXT BOOKS

1. Economic Mineral Deposits - Bateman Allan .M.
2. Economic Geology – Charles Richardson
3. Mineral Deposits - Lindgren W
4. Introduction to Ore-Forming Processes – Lawrence Robb
5. Ore Geology and Industrial Minerals – Anthony M Evans
6. Principles of Geochemistry – Brian Mason
7. Essentials of geochemistry. Jones & Bartlett Publishers
8. Ore Deposits of India   - G.K.Gokhale & Rao T.C.
9. Indian Mineral Resources -   S.Krishnaswamy
10. Minerals of Karnataka -   B.P.Radhakrishna
11. Treatise of Minerals of India   - R.K.Sinha

3. CHEMISTRY (OPTIONAL)

FIFTH SEMESTER B.Sc. COURSE

Chemistry
Paper-I
Code : 14BSCCHET51
Teaching Hours : 50 Hours

Inorganic Chemistry:

Coordination Chemistry-I   **07 hours**

Review of terms- double salts, complex salts, central metal ion, ligand, types of ligands, complex ion and coordination number. IUPAC nomenclature

Valence bond theory of coordination compounds with reference to $[Fe(CN)_6]^{3-}$, $[Fe(CN)_6]^{4-}$, $[FeF_6]^{3-}$, $[Zn(NH_3)_4]^{2+}$, $[Ni(CN)_4]^{2-}$ and its limitations.

Isomerism- Ionisation, hydrate, linkage, geometrical and optical in coordination compounds with respect to coordination number 4 and 6.

Theory of gravimetric analysis   **04 hours**

Principles of gravimetric analysis- super saturation, von Weimar equation, conditions of precipitation, coprecipitation and post precipitation. Separation of precipitate from mother liquor, washing, properties of wash liquid, drying and ignition of precipitate, weighing form.

Inorganic polymers   **04 hours**

Inorganic polymers, Types, comparison with organic polymers, silicones, phosphonitrilic halides- formation, structure and applications.

Green Chemistry   **03 hours**

The need for green chemistry and eco-efficiency, green methods, green products, recycling of wastes, 12 principles of green chemistry.

Organic Chemistry:
Heterocyclic Compounds   **05 hours**

Classification, molecular orbital picture and Aromatic character of furan, thiophene, pyrrole and pyridine, synthesis of the following compounds.

i) Furan, thiohene and pyrrole from 1,4- diketones.

ii) Pyridine by Hantzch synthesis.

Electrophilic substitution reactions of pyrrole, furan and pyndine(chlorination and nitration), comparison of basicities of pyridine, piperidine and pyrrole.

Organic Synthesis via enolates   05 hours
Acidity of α-hydrogens, synthesis of ethylacetoacetate(EAA) by Claisen condensation and its mechanism, synthesis of diethyl malonate, keto-enol tautomerism of EAA
Synthesis of following compounds using EAA and diethyl malonate:
i) ketones ii) carboxylic acids iii) heterocyclic compounds iv) dicarboxylic acids.

Alkaloids   06 hours
Definition, source, classification and general characteristics, Hofmann exhaustive methylation with pyridine as an example.
Isolation, constitution and confirmation by synthesis – Coniine, hygrine and nicotine.

Physical Chemistry:

Microwave Spectroscopy   05 hours
Classification of molecules, rotational spectra of rigid diatomic molecules, criteria for showing the spectra, energy levels of rigid rotator, selection rules (final equations only), determination of bond length and moment of inertia of HCl molecule.

Phase rule   05 hours
Terminology and explanation of the terms involved.Applications of phase rule-
One component system-water and sulphur systemsTwo-component systems-Bismuth-Cadmium system and KI – water system.Eutectic and freezing mixture.

Vibrational spectrum   06 hours
Simple harmonic oscillator, Hooke's law, energy level of simple harmonic oscillator model of diatomic molecule(final equations only), selection rules, zero point energy determination of force constant and qualitative relation between force constant and bond dissociation energies. Vibrational degrees of freedom of molecules(Linear and non linear).

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   Shreiver and Atkins

Books recommended for organic chemistry:
01. Organic Chemistry   I.L. Finar Vol-1
02. Organic Chemistry   Morrison and Boyd
03. Advanced Organic Chemistry   Jerry March

Books recommended for physical chemistry:
01. Fundamentals of Molecular Spectra   C.N. Banwell
02. Molecular Spectroscopy   S. Chandra
03. Molecular Spectroscopy   White
04. Chemical Kinetics   K.J. Laidler
05. Surface Chemistry   Gregg

<div align="center">

Chemistry
Paper-II
Code : 14BSCCHET52
Teaching Hours : 50 Hours

</div>

Inorganic Chemistry:

Industrial Chemistry-I   **08 hours**
Alloys-Significance, types of alloys (ferrous and non ferrous alloys), preparation (fusion and electro-deposition) and their applications.
Abrasives- Classification, Mohr scale of hardness, Manufacture and application of carborundum, alundum, tungsten carbide.
Glass - physical and chemical properties of glass, raw materials, manufacture using tank furnace, Annealing of glass, types, composition and uses of glasses.

Industrial Chemistry-II   **09 hours**
Cement - Raw materials, composition of Portland cement, manufacture by rotary kiln method, mechanism of setting.
Pigments - Manufacture and relative merits of white lead, Lithopone, Titanium white, constituents of paints and varnishes.
Fuels - characteristic and calorific values of fuels, advantages of gaseous fuels, Manufacture of water gas and biogas.

Organic Chemistry:

Reagents and Reactions   **08 hours**
Preparation, mechanism of action and applications - DCC(Amide formation), $LiAlH_4$(reduction of aldehyde, carboxylic acid and ester), DDQ(Benzylic oxidation of tetralin, aromatisation of tetralin), Lead Tetra Acetate(oxidation of 1,2-diols), NBS(allylic bromination), OsO_4(hydroxylation of alkenes), PCC(Pyridinium chlorochromate) in the oxidation of primary alcohols.

Mass Spectroscopy   03 hours

Principle, instrumentation, definitions of parent peak and base peak, McLafferty rearrangement with respect to butyraldehyde.

Dyes   05 hours

Classification, requirement of a dye, colour and constitution.
The synthesis of each of the followimg class of dyes-
Azo dyes–Congo red,Vat dyes–Indigo,Anthraquinone dyes–Alizarin
Triphenylemethane dyes–Malachite green, Crystal violet
Phthalein dyes-Fluoroscein,Eosin; Synthesis of each dyes

Physical Chemistry:

Surface Chemistry   08 hours

Adsorption, derivation of Frendlich and Langmuir's adsorption isotherms. forms of Langmuir's adsorption isotherms at high and low pressure regions, BET equation (No derivation), determination of surface area using BET equation.
Calalysis–Theories of catalysis-intermediate and adsorption theory, enzyme catalysis-Michaelis–Menten equation, industrial applications of catalysis.

Chemical equilibrium   05 hours

Thermodynamic treatment of law of mass action, van't Hoff reaction isotherm, relationship between K_p, K_c and K_x, variation of K_p and K_c with temperature and pressure.

Kinetics of chain reactions   04 hours

Examples of chain reactions, general aspects of chain reactions, chain length, chain transfer reactions, chain inhibition, kinetics of branching chain reactions.

Reference books for inorganic chemistry
01. Industrial chemistry   B.K. Sharma
02. Engineering Chemistry   Jain and Jain

Books recommended for organic chemistry:
01. Reaction Mechanism   P.S. Kalsi
02. Mass Spectroscopy   Y.R. Sharma
03. Synthetic Organic Chemistry   Gurdeep Chatwal
04. Organic Chemistry   P.L. Soni
05. Organic syntheses   Jagadamba Singh and Yadav

Books recommended for physical chemistry:
01. Electrochemistry   Glasstone
02. Physical Chemistry   Atkins
03. Engineering Chemistry   Jain

CHEMISTRY PRACTICALS

FIFTH SEMESTER B.Sc. COURSE
Chemistry Practical
Paper-I
Code : 14BSCCHEP51

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

A.   Organic Preparations

01. Preparation of m-dinitrobenzene from nitrobenzene.
02. Preparation of phthalimide from phthalic anhydride and urea.
03. Preparation of p-bromoacetanilide from acetanilide.
04. Preparation of p-bromoaniline from p-bromoacetanilide.
05. Preparation of p-nitroacetanilide from acetanilide.
06. Preparation of p-nitroaniline from p-nitroacetanilide.
07. Preparation of benzoic acid from benzaldehyde.
08. Preparation of methyl orange.

B.   Instrumental Analysis:

01. Estimation of Fe^{+3} spectrophotometrically through phenanthroline complex.
02. Determination of pH of biological fluids like milk, orange juice, citric acid, solution and sodium carbonate solution.

Note: In case of **Part A**, not more than three students should be given the same preparation at the time of examination.

CHEMISTRY PRACTICALS

FIFTH SEMESTER B.Sc. COURSE
Chemistry Practical
Paper-II
Code : 14BSCCHEP52

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

A.   Inorganic volumetric experiments:

01. Preparation of aqueous iron solutions and estimation of iron using standard $K_2Cr_2O_7$(Internal indicator method).
02. Preparation of aqueous solution of copper and zinc from brass and estimation of percentage of copper using standard sodium thiosulphate solution.
03. Preparation of calcium solution from lime stone and estimation of percentage of calcium using oxalate method.
04. Estimation of zinc using standard solution of potassium ferro cyanide (Standardization of the titrant be done using standard zinc sulphate solution.

B.   Physical Chemistry experiments :

01. Determination of the concentration of HCl by conductometric titration using the standard NaOH.
02. Determination of the concentration of CH_3COOH by conductometric titration using the standard NaOH.
03. Determination of equivalent conductance of strong electrolyte(NaCl) at infinite dilution.
04. Determination of dissociation constant of (weak acid) acetic acid conductometrically.
05. Determination of percentage composition of unknown mixture of A & B liquids using Abbe's refractometer by formula method.
06. Determination of percentage composition of unknown mixture of A & B liquids using Abbe's refractometer by graphical method.
07. Conductometric precipitation titration of NaCl vs $AgNO_3$.
08. Determination of specific rotation of glucose solution by polarimeter.
09. Determination of solubility of sparingly soluble salt($BaSO_4$) conductometrically

NOTE: For Examination, following combinations have to be given.

Combination-1: Organic Preparation of Practical-Va +Physical of Practical-Vb.
Combination-2: Instrumental analysis of Practical-Va + Inorganic volumetric of Practical-Vb.

4. ELECTRONICS (OPTIONAL)

B. Sc. SEMESTER –V

PAPER – I

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

ELE- 5.1: COMMUNICATION, OPTICAL FIBER COMMUNICATION & TRANSDUCERS.

UNIT –I: COMMUNICATION

Electromagnetic radiation, different layers of Ionosphere and wave propagation through them. Skip-distance, Maximum usable frequency. Virtual height, Critical frequency, Critical angle, Secant law and fading.

Modulation: Need for modulation. Types of modulation. Theory of amplitude modulation, modulation index side bands, power relations, linear modulation, square law modulation.

FM modulation: Expressions for FM wave, modulation index. Deviation ratio, FM side bands,

Phase modulation: Expressions for phase modulation

<div align="right">8Hrs. +2Hrs.Problems =10hrs</div>

UNIT II: TRANSMITTERS AND RECEIVERS

Block diagram of AM transmitter. Diode modulator, Transistor modulator (collector to base), Demodulation, Diode AM detector, transistor AM detector, FM detector-balanced slope detector, Foster-Seeley discriminator and ratio detector. (Qualitative)

Receiver characteristics (sensitivity selectivity, fidelity, signal to noise ratio, noise figure and stability). Determination of receiver characteristics. Image frequency, intermediate frequency and its choice. Super heterodyne AM receiver (Explanation of each block with diagram). Block diagram of FM receiver. Comparisonof FM receiver with AM receiver.

<div align="right">8Hrs.+2Hrs.Problems =10hrs</div>

UNIT –III: TRANSMISSION LINES AND ANTENNA

Transmission Lines: Introduction, different types of transmission lines (parallel and co-axial lines) current and voltage relation on RF transmission lines.

Antenna: Radiation mechanism, Hertzian Dipole, Theory of dipole antenna, polar diagrams of dipole antenna, radiation resistance, efficiency, study of yagi and dish antenna. Feed mechanism, Casegrain feed antenna.

Qualitative study of Helical antenna, Loop antenna, Parabolic reflector, Horn antenna and Micro strip antenna

8Hrs.+2Hrs.Problems =10hrs

UNIT –IV OPTICAL FIBER COMMUNICATION.

OFC: Introduction, block diagram of optical fiber communication system, principle of light transmission in a fiber, expression for numerical aperture(Derivation), optical fiber modes and configurations. Fiber materials and losses in fibers. Types of Light sources and Detectors. Advantages and Disadvantages of OFC over metallic cables.

8Hrs. +2Hrs.Problems =10hrs

UNIT – V: TRANSDUCERS

Introduction - General measurement system – characteristics - definition – static & dynamic transducers, Different types - resistive transducer - strain gauge – capacitive - inductive transducers - LVDT (variable inductive transducers) piezoelectric transducer – temperature transducers, thermo couple, thermistors – ultrasonic temperature transducer. Microphones (Carbon, Condenser), Loud Speakers (Moving Coil)Types of Speakers based on frequency.(Woofer , Tweeter)

8Hrs.+2Hrs.Problems =10hrs

REFERENCE BOOKS:

1. Electronic Communication Systems   - by Kennedy and Devis(TATA McGraw –HILL EDITION

2. Electronic Communication, Roddy and Coolen, 4th edition, PHI

3. Transducers and Instrumentation By DVS Murthy, PHI 1995

4. Optical Fiber Communication By Gerd Keyser

5. Instrumentation Measurements and Communication By B C Kakra and K K Choudhary , TMH 1985

6. Hand Book of Electronics By Gupta and Kumar

7. Electronics Instrumentation ByKalsi

LIST OF EXPERIMENTS
Lab-5.1:

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

1. Amplitude modulator and Amplitude demodulator

2. Frequency modulation and demodulation

3. Diode as a detector (Sketch input and output wave forms)

4. Straight radio receiver (Selectivity, Sensitivity)

5. Selectivity of a super heterodyne radio receiver

6. Time Division Multiplexing and de multiplexing

7. Frequency Multiplexing

8. Radiation pattern studies of different dipole Antenna

9. Studies on Antenna equivalent circuits.

10. Temperature transducers(Application of Thermister)

11. Speaker characteristics and comparison (Tweeter, Woofer)

12. Microphones characteristics and comparison (Carbon, Diaphragm)

13. Numerical aperture of OFC

14. Characteristics of OFC

B. Sc. SEMESTER – V

PAPER - II

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

ELE- 5.2: MICROPROCESSOR AND MICROCONTROLLER

UNIT- I: MICROPROCESSOR ARCHITECTURE AND   INSTRUCTIONS

Microprocessor – Introduction Intel 8085, application, basic block diagram, speed, word size, memory capacity and classification.

Microprocessor 8085 – Features and architecture. Pin diagram of 8085.

Supporting circuits; clock circuits, request circuits, generation of control signals. Bus drivers.

Instruction set-Classification, Addressing modes, Status flags and instruction formats, Operation code, Operand, Mnemonics

8Hrs.+2Hrs.Problems =10hrs

UNIT-II: STACK OPERATIONS AND PROGRAMMING

Program counter, Stack, Stack pointer operations, subroutine, calls and return operations. Interrupts. Delay loops, Timing diagrams- instruction cycle, machine cycle and T-states. Timing diagrams of Opcode fetch cycle,Memory read cycle & Memory write cycle.

Programming preliminaries, Assembler concept, Programs of data transfer and memory operation (direct and indirect addressing) addition and subtraction of 8 bit and 16 bit numbers, multiplication and division of 8 bit numbers, display of largest and smallest numbers in a given array of numbers. Solve problems.

8Hrs.+2Hrs.Problems =10hrs

UNIT-III: INTERFACING OF 8085

Interfacing; Interfacing; Basic interfacing concepts, compatible IC of 8085, **Interfacing Techniques:** Memory mapped I/O, I\O mapped I\O. Memory interfacing, I/O interfacing, I/O devices, Programmable interval timer (8253): Need for8253,features,Block diagram, pin diagram, operating modes, D to A converter using 8085 and op-amp. **Programmable peripheral Interface IC 8255:**features , pin diagram, functional block diagram ports and their modes.

UNIT-IV: MICROCONTROLLER 8051 PROCESSOR ARCHITECTURE AND INSTRUCTION SET

Introduction to Microcontroller, Comparison of microprocessor and microcontroller, Microcontroller structure (Block Diagram), IC8051 pin diagram, Memory organisation of IC 8051, addressing modes, external addressing, Interrupts,

Instruction set: Data movement instructions, Arithmetic instructions, Bit operators, Execution change operators, Assembly language programming types and some examples.

<div align="right">8Hrs.+2Hrs.Problems =10hrs</div>

UNIT-V: PIC microcontrollers & Embedded system

PIC microcontrollers

Core features of PIC microcontrollers, overview of various PIC microcontroller series. PIC 16F877A-features, pin diagram, I/O ports, interfacing with LCD.

<div align="right">**4 hours**</div>

Introduction to embedded system:

Embedded systems and general purpose computer systems. Architecture of embedded system. Classifications, applications and purpose of embedded systems.

<div align="right">**6 hours**</div>

REFERNCE BOOKS:-

1. Microprocessor Architecture, Programming and applications with the 8085 by- Ramesh Gaonkar

2. Microprocessor by- B.Ram

3. The 8051 Microcontroller Architecture, Programming and applications by- Kenneth Ayala

4. Programming and Customizing, The 8051 Microcontroller by-MykePredko

5. VLSI TECHNOLOGY by - S.M.SZE (TATA McGraw-Hill EDITION)

6. Intel Microprocessors   by- BB Bray   4Edn PHI 1999

7. Software, Hardware and Applications by – Walter A Tribel and Avatar Sing PHI 1995

8. Microprocessors and Microcomputers by – RafeeqUzaman

LIST OF EXPERIMENTS

Lab. - 5.2: Each experiment is of four hours duration.

Minimum EIGHT experiments are to be performed.

Programming using 8085

1. Addition and Subtraction.

2. Multiplication and Division.

3. Largest and smallest of an array.

4. Arranging an array of numbers in ascending and descending order.

 5. D/A converter using 8255 and op-amp.

6. IC 8253 as a square wave generator.

7. Sine wave generator. Programming using 8051

8. Addition and Subtraction.

9. Multiplication and Division.

10. Largest and smallest of an array.

11. Arranging an array of numbers in ascending order and descending order.

12. 7 Segment Display.

13. Stepper motor.

14. Temperature measurement.

5. GEOGRAPHY (OPTIONAL)

REGULATION AND SCHEME OF INSTRUCTIONS

Regulations governing three years Semesterized, Bachelor Degree Programmes of Rani Channamma University, Belagavi (framed under Section 44(1) (c) of the K.S.U. Act 2000) and on par with CBSE with the effect from 2015-16 onwards.

I. Goals & Objectives:

The following aims have been kept in view while designing the syllabus of Bachelor's Degree Programme (B.A/B. Sc) in Geography as one of the optional subject.

1. To bring the geographical awareness among the students.
2. To provide a fundamentals of spatial information of the earth surface.
3. To train promising learners to teach geography effectively at various levels in

   the educational institutions.

4. To train and provide information related to spatial and regional level
   of planning.

5. To provide adequate geographical knowledge and skills as needed for the
   competitive examinations.

6. Organizing the professional tours for every year to cultivate research culture
   among the students.

II. Admission Criteria:

A candidate should have passed PUC/10+2 with Geography as one of the subject is eligible to choose Geography as one of the optional subjects at the under Graduate Course. The candidate should have obtained at least 40 per cent of marks in Geography as well as aggregate marks. Relaxation in respect of SC/ST etc will be followed as per the prevailing rules of the university. Other rules for admission are as per the university notification from time to time.

III. Medium of Instruction:

The medium instruction shall be English, however, the student's are allowed to write the examination in Kannada Medium.

IV. Attendance:

A minimum of 75% of attendance in each semester (both theory and practical) is compulsory.

V. Scheme of Instruction:

1. The M.A/M.Sc Master's Degree holders in Geography can only teach the subject at UG Level.
2. Geography as an optional subject at Under Graduate (UG) Level, which consists of *six* semesters, it includes eight *theory* papers and *eight practical* papers. There will be **one theory** paper and **one practical** paper in the each semester **i.e. Ist, IInd, IIIrd, and IVth** *semesters*. Whereas in the **Vth and VIth** semesters, there will be **two theory** papers and **two practicals** each of **100 and 50** *marks* respectively. The duration of teaching hours for the theory paper will be **five** *(05) hours per week* and the duration of teaching hours for practical *paper will be* **four** *(04) hours per week* in each semester. Each theory paper will have 5 modules/units (divided into chapters/units). The duration of each semester is being 16 weeks excluding examination period.
3. The Practical's are to be conducted in separate batches. Each batch consists of 15 students with one teacher, for 16-27 students with two teachers. In case, if student number is below 15 is also considered as one batch with one teacher. Each batch (depends on the number of students) must be supervised by one/two teachers for giving instructions, supervision of practical's and correction of journal/records.

VI. Scheme of Theory Examinations:

1. Theory course shall carry 100 marks of which 80 marks allotted for semester end examination and 20 marks for internal assessment (IA) that will be carried out as per the university norms.
2. Each theory course will have a question paper of 3 hours duration and the maximum of 80 marks. Minimum marks to pass in each paper of theory are 40 percent.

3. There shall be three sections in every theory question papers viz. A. B. & C. **Section A** shall have 12 questions of each 2 marks and candidate have to attempt 10 questions only (10X2=20 marks). **Section B** shall have 8 questions of each 5 marks and the candidate have to attempt 6 questions only (6X5=30 marks). **Section C** shall have 6 questions of each 10 marks and the candidate has to attempt 3 questions (3X10=30 marks).

VII. Scheme of Practical Examination:

1. Each practical course shall carry 50 marks of which **10 marks** are allotted for IA marks (out of which **07 marks** are kept for practical records (assignments)/journals and **03 marks** allotted for attendance). The **40 marks** examination will be conducted at the end of each semester, out of which **5 marks** will be kept for viva and **35 marks** for written examination as per the instruction given by the university.
2. Each practical course will have a question paper of 4 hours duration and the maximum of 40 marks.
3. The practical examination is to be conducted in batches and each batch consists of minimum of 15 candidates.

4. There will be one internal examiner and one external examiner to conduct the practical examination for each batch in each semester.

5. Minimum marks to pass in each paper of practical are 40 percent.
6. Each candidate shall complete the laboratory work of the journal/practical records, it shall be certified and signed by both the concerned course teacher and the Head of the Department of Geography of the concerned college, to the effect that the candidate has completed the prescribed course in practical satisfactory and same should be produced at the time of practical examination. No students shall be allowed for the examination without completed journal/practical records.
7. There is no provision for seeking improvement in practical paper examination and internal assessment marks.

----O----

B. A. / B. Sc SEMESTER GEOGRAPHY (OPTIONAL)

COURSE   STRUCTURE   (SCHEME) UNDER CBSE SYSTEM

WITH EFFECT FROM 2017-2018ON WARDS

Theory and Practical Paper- V and VI

Semester	Title of the Paper	Teaching Hours per Week	Marks	Internal Assessment Marks (IA)	Total Marks	Duration of Examination
V	Theory Paper – V -Compulsory **Regional Geography of India**	05	80	20	100	3 hours
	Practical Paper - V *Interpretation of IMD Weather Maps*	04	40	10*	50	4 hours
	Theory Paper – VI -Optional (select any one) **VI- A. Development of Modern Geography**	05	80	20	100	3 Hours
	VI- B. Settlement Geography	05	80	20	100	3 hours
	Practical Paper – VI *Basic Statistics*	04	40	10*	50	4 hours
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

(* Note: Practical IA includes: 02+03+07 Marks for Assignment, Attendance & Journals only)

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

SEMESTER – V

THEORY PAPER-V (Compulsory)

REGIONAL GEOGRAPHY OF INDIA

Objectives: To understand the India in terms of various physical divisions, their important characteristics and intra-regional and inter regional linkages and to analyze natural and human resource endowments and their conservation and management. The study also synthesis the students with development issues and polices and programmes design for regional development.

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	India : Location and Extent, Physiography, Drainage, Climate, Soil and Natural Vegetation and its importance	12
II	Water Resources and Irrigation: Multipurpose River Projects mainly-Bhakra-Nangal, DVC, Nagarjunasagar Krishna and Tungabhadra projects. Agriculture: Significance and types of Agriculture, Floriculture, Cultivation, distribution and production of Rice, Wheat, Sugarcane, Cotton, Tea and Coffee in India.	16
III	Mineral Resources: Distribution and Production of Iron ore, Manganese, Coal, Petroleum & Natural Gas. Industries: Industrial regions of India. Distribution and Production of Iron and Steel, Cotton textile, Sugar, Paper, Automobile and Shipbuilding Industry in India.	12
IV	Transport: Road and Railway, Major Ports: Mumbai, Kolkata, Chennai and Mangalore.	10
V	Population: Growth and Distribution of Population, Density of Population and Causes and Consequences of Growth and Distribution. Urbanization in India. Location of the following important elements on the given map of India-	10

	hills, rivers, soils, river projects, industries, roads, towns, tourist and urban centers, parks and wild centuries. (**Note**: Staff in charge should supply the outline map of India and train the students and it has to be treated as compulsory question in semester end examination.)		
		Total	**60 hours**

Reference:

1. .Ranjit Thirtha- Geography of India

2. Sharma & Coutinho- Economic and Commercial Geography of India

3. Tiwari.P.S- Geography of India

4. C.B.Mamoria - Economic and Commercial Geography of India

5. Ranganath - Regional and Economic Geography of India (Kannada)

6. Mallappa. P- Regional Geography of India (Kannada)

7. M.B.Goudar- Regional Geography

8. S.S.Hangaragi- Regional Geography of India (Karnataka)

----0000----

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

SEMESTER – V

PRACTICAL PAPER - V

WEATHER INSTRUMENTS & INTERPRETATION OF

IMD WEATHER MAPS

Units	Topic	Teaching Hours
I	Meaning: Elements of Weather and Climate, Brief review of Indian Meteorological Department (IMD), Meteorological and Rain gauge stations and its Importance.	04
II	Meteorological Instruments: Drawing of meteorological instruments- Thermometer, Barometer, Wind-vane, Rain gauge & its importance.	04
III	Introduction to IMD Weather Maps: Drawing of Weather symbols, Season and seasonal variations, Isobars, Isobaric Pattern, Depression, Cyclone, Anticyclone, Calm Conditions, Forecasting and its Characteristics (Illustration is necessary)	12
IV	Season-wise detail Interpretation of IMD Weather Maps: a. Winter Season (at least two map from each season) b. Summer Season (at least two map from each season) c. Monsoon Season (at least two map from each season) d. Post-Monsoon Season (at least two map from each season)	20

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)

8. Pijushkanti Saha & Partha Basu: Advanced Practical Geography

----0000----

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

SEMESTER – V

THEORY PAPER-VI (Select any one)

(OPTIONAL)

PAPER VI- A: DEVELOPMENT OF MODERN GEOGRAPHY

Objectives: This paper is intended to acquaint the students with distinctiveness of geography as a field of learning in social science and science as well as in natural science. The philosophy and methodology of the subject is discussed in length and to provide the students for comparative understanding of the development of the history of geographic thought.

Course structure : One Theory and One Practical

Teaching Theory : 05 hurs 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 (7 marks for Journal/Practical records

as internal assessment (IA) and 3 marks for attendance.

Units	Topic	Teaching Hours
I	Introduction to Geographical Thought-Philosophy of Geography, Early Modern Geography, Growth of Geography as a Special Science	10
II	Founders of Modern Geography: i.) Alexander Von Humbolt, ii) Carl Ritter, iii)Friedrich Ratzel iv) Vidal de la Blache, v) William Morris Davis vi) Ellen Churchill Sample vii) Halford J Mackinder and viii) Richard Hartshorne	12
III	Development of Geography as a study of- a) Scientific Discipline, b) Man-Environment Relationship with reference to Determinism & Possibilism, c) Areal Differentiation d) Spatial Organization- Structure, Pattern & Process e) Inductive vs deductive, f) General Vs Particular and g) Quantitative vs qualitative	10
IV	Development of Scientific Method, Models, Hypothesis, Laws & Theories, Quantitative revolution	12
V	Approaches in Geography- Positivism, Humanism, Radicalism, Behaviouralism and Post Modernism Paradigms and Philosophy in Geography	16
	Total	**60 hours**

REFERENCES:

1. Adhikari Sudeepta (1972)   :Fundamentals of Geographic Thought Chaitanya Publishing House, Allahabad
2. Cook and Johnson: Trends in Geography, Pergamow Press London
3. Dickinson R.E.(1969): The Makers of Modern Geography, Rout/Edge & Kegan Paul, London
4. Dixit R.D. (1999) : Development of Geographic Thought, Longmans India Limited
5. Free Man T.W.(1965): Geography As Social Science, Harper International Edition, Harper & Row Publishers, New York
6. Harvey D. (1969): Explanation in Geography London, Edward Arnold
7. Hartshorne R.(1959): Perspective on the Nature of Geography Rand McNally, Chicago
8. Majid Hussain (1999): Geographic Thought Rawat Publishing House, Jaipur
9. Holt Jensen, Arid: (1998): Geography: History and Concepts, Sage Publication, New Delhi
10. Richard Peet (1977): Radical Geography - Alternative View Points On Contemporary Social Issue, Methuen & Co. Ltd, London

----0000----

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

SEMESTER – V

THEORY PAPER-VI (Select any one)

(OPTIONAL)

PAPER VI- B: SETTLEMENT GEOGRAPHY

Objectives: The aim is to acquaint the student with spatial and structural characteristics of Human settlement under varied environmental conditions, to enable them to diagnose spatial issues related to urban and rural settlements.

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 (7 marks for Journal/Practical records

as internal assessment (IA) and 3 marks for attendance.

Units	Topic	Teaching Hours
I	Definition, Meaning, Nature and Scope of Settlement Geography Rural as opposed to Urban.	08
II	Settlements: types of settlements, Rural Settlement as a service and market center. Integrated Rural Development Planning (IRDP). Economic characteristics of cities and its functions.	14
III	Rural migration and its impact on agriculture and mining. Interaction between Rural-Urban settlements. Urbanization: Meaning and Trends of Urbanization in India.	14
IV	Theories of Urban landuse: Concentric zone theory and Sector theory, Multi-nucli theory. Central Business District (CBD) and its Characteristics.	14
V	Urban Fringe: characteristics and its development. Slums: Meaning, formation of slums and its measures for clearance.	10
	Total	**60 hours**

References:

1. R.B.Mandal- Introduction to Rural settlements
2. H.D.Clout- Rural Geography : An Introductory survey
3. H.Carter- The study of Urban geography
4. Jahonson- Intruduction to Urban Geography
5. Dickinson R.E. -City and Region
6. Mandal R.B. - Urban geography

7. Settlement Geography : Siddarth
8. Human Geography: Hussain. M.
9. R.Y.Singh- Geography of Settlement
10. Mallappa. -Human Geography(Kannada)
11. Ranganath- Fundamentals of Human Geography (Kannada)

----0000----

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

SEMESTER – V

PRACTICAL PAPER - VI

BASIC STATISTICS

Units No.	Topic	Teaching Hours
I	Definition and meaning, use of statistical methods in Geography Data: Defining Data, Types of Data: Nominal, Ordinal, Interval and Ratios, Collection of Data: Primary and Secondary Data and Classification and Tabulation of data	08
II	Sampling: Methods and Types of Samplings Formation of Frequency Distribution: Frequency Table, Drawing of Histogram, Frequency Curve, Polygon and Ogive Curve.	08
III	Measures of Central Tendency: a. Mean, b. Median and c. Mode	10

IV	A. Measures of Dispersion :
	  1. Range,
	  2. Quartile Deviation,
	  3. Mean Deviation,
	  4. Standard Deviation and
	  5. Co-efficient of Variation
	B. Correlation: Rank order Correlation and Pearson's Product Movement correlation
		14

V		
	Total	**40 hours**

Reference :

1. R.L.Singh- Elements of Practical Geography
2. Gopal Singh- Practical Geography
3. Dr. Ranganath - Practical Geography : (Kannada)
4. Singh and Kanoj- Practical Geography
5. R.P.Misra and Ramesh- Practical Geography :Fundamental of Cartography
6. M.F.Karennavar & S.S.Nanjannavar.- Practical Geography : (Kannada)
7. B.S.Negi.- Statistical Geography
8. Basic Statistics   : S.P.Gupta
9. Statistical Methods In Geographical Studies : Mahammad Aslam.
10. Advanced Practical Geography-Pijushkanti Saha & Partha Basu

6. BIOTECHNOLOGY(Optional)

BIOTECHNOLOGY (Optional) 2019-20 & Onwards
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	10Marks				40Marks
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	10Marks				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				40Marks

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

PAPER 5.1 – PLANT AND ANIMAL CELL TECHNOLOGY HOURS: 50 HRS

Unit 1. Plant tissue culture: In vitro methods in plant tissue culture, aseptic Techniques. Types of nutrient media and use of growth regulators (Auxins, Cytokininis and Gibberellins).In vitro fertilization – Ovary and Ovule culture. Micropropogation of elite species.Organ Culture – Anther, Embryo and Endosperm culture and their applications.   **10 Hrs**

Unit 2. Protoplast Culture: Isolation, regeneration and viability test, somantic hybridization, methods of protoplast fusion – chemical and electro fusion, practical application of somantic hybridization and cybridization. Somaclonal variation and their significance. In vitro production of secondary metabolites – Techniques and significance. Transgenic plants : Technique of transformation – biological(Agrobacterium mediated), physical and chemical methods. **10 Hrs**

Unit 3. Animal cell culture : Media and its components - Primary Culture – Cell lines, and cloning disaggregation of tissue, isolation of tissue, enzyme disaggregation, and mechanical disaggregation. Secondary Culture – transformed animal cells and continious cell lines. Growth factors – Promting proliferation of animal cells EGF, FGF, PDGF, IL-1, IL-2, NGF and erythropoietin. **10 Hrs**

Unit 4. Transgenic animals: Transfection of animal cell lines. Selectable Makers and Transplantaion of Cultural Cells.Expression of Cloned proteins in animal cell – Expression vector, over production and dowm stream processing of the expressed proteins. Production of Vaccines in animal Cells. Production and Applications of monoclonal antibodies. Production of transgenic animals **10Hrs**

Unit 5. Biotechnology and Intellectual property rights: Patents, trade secrests, copyright, trademark, Geographical indications, WIPO, TRIPS. Procedure involved in patenting biotechnological inventions. **10 Hrs**

PAPER-5.2 PRACTICALS:

1. Preparation of culture media (plant and animal)

2. Production of Callus and suspension Culture

3. Plant Protoplast Isolation

4. Plant propagation through Tissue culture (shoot tip and Nodal culture)

5. Planting and Maintenance of Medicinally important plants and its medicinal importance (1 student, 2 Plants compulsory)

6. Preparation of Synthesis seeds

7. Anther Culture

8. Trypsinization of animal tissue

9. Animal cell culture of trypsinized cells

10. Preparation of balanced salt solutions :(Hank and Earl)

11. Extraction of serum (chicken / mammalian).

12. Chick embryo extract (10-11 days embryos).

13. Culture of animal cells (chick embryo cells) by following techniques.

a) Plasma clot. b) Single slide method / hanging drop technique.c) Range method.

d) Grid method.

References:
1. Ravishankar G.A and Venkataraman L.V(1997) Biotechnology applications of Plant Tissue & cell culture. Oxford & IBH Publishing co., Pvt Ltd.
2. Bhan (1998) tissue Culture, Mittal Publications, New Delhi.
3. Islan A.C (1996) Plant Tissue Culture, Oxford & IBH Publishing Co., Pvt. Ltd.
4. Lydiane Kyte & John Kleyn (1996) Plants from test tubes. An introduction to Micropropogation (3rd Edition) timber Press, Partland.
5. Kumar H.D (1991) A test book book on Biotechnology (2nd Edition). Affiliated East West Press Private Ltd. New Delhi.
6. Chrispeel M.J. and Sdava D.E. (1994 Plants, Genes and agriculture, Jones and Barlett Publishers, Boston.
7. Reinert J. and Bajaj y.P.S (1997) Applied and fundamental Aspects of Plant Cell, Tissue, and Organ Culture, Narosa Publishning House.
8. .Bhan 1998.'Tissue culture', mittal publication. New Delhi.
9. Chatwal.G.R.1995: Text Book of Biotechnology, Anmol Publ.Pvt.Ltd.
10. Chawla H.S. Introduction to Plant Biotechnology , 2007, Oxford and IBM publishing Co Ltd., New Delhi.
11. Chadha K.L. Hand book of Horticulture, 2007, Indian Courses of Agri research, New Delhi
12. Crueger.W.and Crueger.A:Biotechnology – A textbook of Industrial Microbiology.2nd Ed.
13. Gamborg and Phillips .1996 Plant cell, tissue and Organ Culture:Fundamental methods.Narosa Publ,
14. Gupta P.K.1996: Elements of biotechnology; Rastogi and Company.
15. Harrison,Maureen,A.,Rac.Ian.F. 1997: General Technique of cell culture.Cambridge University Press. York
16. Freshney R.L. 1987: Cultures of animal cells: A manual of basic techniques.Ian R.Freshney: Wiley-Liss (3rd Ed) culture of Animal cells
17. John.R.W: Animal cell culture-practical approach, oxford

18. Pulher A. 1993: Genetic Engineering of animals, VCH publishers, Weinhelm FRG.
19. Ravi Shankar G.A and Venkataram L.V. 1997, Recent advances in biotechnology, oxford and IBH Publishing company.
20. Sateesh M.K.2003 Biotechnology-5, New age international publishers
21. Spier R.E.and Griffith T.B.1987: Modern approaches to animal cell technology, Somerset,
22. Butterworth and company

PAPER-5.3 RECOMBINANT DNA TECHNOLOGY ANDNANO-TECHNOLOGY. 50Hrs

Unit: 1 Introduction to Genetic Engineering, Tools for genetic engineering-
DNA manipulative enzymes – Restriction enzymes and DNA ligases, Gene cloning vectors – Plasmids, Bacteriophage and cosmids,. In Vitro construction of recombinant DNA molecules –PBR 332, PUC 19), Transformation of r-DNA – Transformation of r-DNA molecules into target host organism's Calcium chloride mediated, Electorporation and microinjection. Screening and selection of recombinant host cells – Immunological screening and colony Hybridization.   **10Hrs**

Unit: 2 Gene Libraries – Genomic DNA and c DNA Cloning techniques,
Molecular biology techniques -
a) Electrophoretic techniques –Proteins and nucleic acids
b) Polymerase chain reaction (PCR)
c) Site directed mutagenesis (SDM)
d) Nucleic acid sequencing – Sanger's method, maxam and gilberts method and automated DNA Sequencing
e) Blotting techniques – Southern, Western and Northern blot   **10Hrs**

Unit: 3 Application of r-DNA technique in human health
a) Production of Insulin
b) Production of recombinant vaccines – Hepatitis – B
c) Production of Human growth hormone.
d) Human genome project and its implication.   **10Hrs**

Unit 4: Introduction to Nanoworld The nanoscale dimension and paradigm,Definitions and historical evolution (colloids etc.) and current practice. Nanoscience and Nanotechnology - Types of nanomaterials and their classifications (1D, 2D and 3D etc.) Nanoparticles, Nanowires, thin films and multilayer. Physical and Chemical Fundamentals of Nanomaterials, Applications in nanotechnology viz. Biosensors, separation of cells and cell organelles, drug delivery, gene therapy etc.
10 Hrs.

Unit 5: Synthesis of nanostructures: Natural in inorganic, Natural in organism, chemical and physical methods –Sol Process, Micelle, Chemical Precipitation, Hydrothermal Method, Pyrolysis, Bio-based Protocol, Chemical Vapor Deposition, Sputtering etc. Applications in various fields viz. Physical and Chemical, Materials, Life Sciences.   **10Hrs.**

Practicals:

1. Isolation / extraction of genomic DNA from bacteria, yeast, plant and animal Tissues.

2. Study of denaturation and renaturation of DNA.

3. Quantification of extracted DNA by spectrophotometer.

4. Isolation of plasmid DNA (E.coli).

5. Agarose gel electrophoresis of DNA..

6. Study of transformation by kits.

7. Isolation of phages by sewage sample.

8. Restriction digestion.

9. DNA finger printing: Comparison of two plates of monomorphic and dimorphic bands (Photographs).

10. Study of gene cloning through charts.

11. Study of principles of genetic engineering equipments.

A) PCR machine   B) Laminar air flow cabinet.

C) Refrigerated centrifuge   D) CO2 incubator.

E) ELISA reader.

F) Incubator shaker.

12. Synthesis of Al_2O_3 nanoparticles using sol gel method.

13. Synthesis of Fe_2O_3, $AuCl_2$ and AgO_2 nanoparticles by chemical method.

14. Synthesis of semiconductor (ZnS, CdS etc.) nanoparticles by chemical method.

 15. Synthesis of nanoparticles using biological process – (2-3 methods).

16. Detection of nanoparticles in colloidal solutions using UV-Vis absorption Technique

Refrences:

1. Glick, B.R & Padternak J.J (1994) Molecular Biotechnology, Princi[ples and Applicatiopns of Recombinant DNA, American Society for Microbiology, Washington D.C

2. Christopler H. (1995) Gene cloning and Manipulating, Cambridge Universoty Press

3. Nicholl, D.S.T (1994) An Introduction of Genetic Engineering, Cambridge University Press.

4. Old. R.W. and Primrose, S.B. (186) Principles of Gene manipulation, An introduction to genetic engineering (3rd Edition) Black well Scientific Publications

5. Watson J.D. Hopins, N.H Roberts, J.W.Stectz J.A and Weiner A.M(1988). Molecular biology of society for Microbiology

7. Lewin b. (1994) Genes VI, New York,Oxford University Press.

8.Handbook of Nanostructured Biomaterials and Their Applications in Nanobiotechnology- Hari Singh Nalwa   9. Nanobiotechnology; ed. C.M.Niemeyer, C.A. Mirkin.

10. Nanocomposite Science & Technology Ajayan, Schadler& BraunoMEMS (Microsystems)- Gerald A. Urban.

11. Introduction to Nanoscale Science and Technology (Nanostructure Science and Technology) - Massimiliano Di Ventra.

12. Nanosystems: Molecular Machinery, Manufacturing, and Computation- K. Eric Drexler.

13. Springer Handbook of Nanotechnology- Bharat Bhushan.

14. Nanobiotechnology; ed. C.M.Niemeyer, C.A. Mirkin.

15. Nanofabrication towards biomedical application: Techniques, tools, Application and impact – Ed. Challa S., S. R. Kumar, J. H. Carola.

7. MATHEMATICS (OPTIONAL)

SYLLABUS FOR   B.Sc. MATHEMATICS (OPTIONAL)
FIFTH SEMESTER (2016-17 onwards)
Paper I
5.1 REAL ANALYSIS

TEACHING HOURS: 50 HRS   **(TEACHING: 5 HRS PER WEEK)**

Unit I.

Riemann Integration-: Partition of an interval. The upper and lower Riemann sums & Riemann integrals. Necessary and sufficient conditions for integrability. Algebra of integrable functions (constant, sum, difference, product, quotient, and modulus).

(10 hrs)

Unit II.

Riemann Integration-(contd..) Integrability of continuous functions, monotonic functions. Fundamental theorem of integral calculus, Change of variables, Integration by parts. The first and second mean value theorem (Bonnet & Weirstrass form) of integral calculus.   **(10 hrs)**

Unit III.

Improper integrals: Improper integrals of first and second kind. Comparison tests. Abel's test and Dirichlet's test.   **(10 hrs)**

Unit IV.

Beta and Gamma functions: Properties, Relation between Beta & Gamma functions and their convergence and Duplication formula.   **(10 hrs)**

Unit V.

Multiple Integrals: Differentiation under integral sign. Double and triple integrals, areas and volumes (Cartesian coordinates).   **(10 hrs)**

REFERENCES:

1) Fundamental Real analysis – S. L. Gupta & Nisha Rani
2) Mathematical Analysis—Shantinarayan and P. K. Mittal
3) A Course of Mathematical Analysis—M D Raisinghania
4) Real Analysis- N.P.Bali
5) A text book of B.Sc. Mathematics- G.K.Ranganath

PAPER II

5.2 NUMERICAL ANALYSIS

TEACHING HOURS: 50 HRS   **TEACHING: 5 HRS PER WEEK**

Unit I.

Solutions of Algebraic and transcendental equations: Bisection method, Iteration method, Newton-Raphson method.
Numirical Solutions of non-homogeneous systems : Gauss Siedal method. Jacobi Iteration Method**.**   **(10 hrs)**

Unit II.
Finite Differences: Operators Δ (Delta), ∇ (Del) & E (Shift), Definitions and their properties, n^{th} order difference of a polynomial,

Interpolation: Newton Gregory forward and backward difference interpolation formula and examples. Lagrange's interpolation formula and examples.   **(10 hrs)**

Unit III.

Numerical differentiation: Forward and backward difference formulae. Computation of first and second ordered derivatives.
Numerical integration : General Quadrature formula, Trapezoidal rule, Simpsons rules ($1/3^{rd}$ and $3/8^{th}$).   **(10hrs)**

Unit IV.

Solution of initial value problems: by ordinary linear first order differential equations by Taylor's series, Euler's, Picard and Runge- Kutta method of order two.

                                                                                                (10hrs)

Unit V.

Difference equations: Basic definitions**,** order and degree, solution, formation of first and second linear difference equations with constant coefficients (simple examples).
                                                                                                (10hrs)

REFERENCES:
1)Introductory method of numerical anaylsis- S.S.Shastri .

2)Calculus of finite differences – H.C,Saxena

3)Numerical methods for scientific and engineering computation- M.K.Jain,

S.R.K.Iyengar,   & R.K.Jain (New Age International Publications)

4)Text Book of Mathematics-G.K.Raganath

5) Numerical Analysis by G. Balaguruswamy

PAPER III

5.3 DYNAMICS AND CALCULUS OF VARIATIONS

TEACHING HOURS: 50 HRS   **TEACHING: 5 HRS PER WEEK**

Unit I.

1.Kinematics: Velocity and acceleration of a particle along a plane curve, Radial and Transverse components of velocity and acceleration, Tangential and normal components of velocity and acceleration.   **(10 hrs)**

Unit II.

Central Orbits: Motion of a particle under a central force. Use of Polar and Pedal co-ordinates. Apse, Apsidal distance and Apsidal angle

(10 hrs)

Unit III.

Motion of a projectile: in a non resting medium under gravity.
Elastic Impact: Direct and Oblique impact of elastic bodies.   **(10 hrs)**

Unit IV.

Calculus Of Variations: Variation of a function f = f(x,y,z),and functional. Variational problems . Fundamental theorem of calculus of variation, Euler's equation.

(10 hrs)

Unit V.
Calculus Of Variations-(contd..): Geodesic on plane , on sphere, Brachistochrome problem , minimum surface of revolution, Isoperimetric problems.   **(10 hrs)**

REFERENCES:
1) Dynamics – M.Ray

2) Text book of Mathematics – G.K.Ranganath

3) Dynamics – P.N.Chatterji

4) Advanced ordinary and partial differential equations by M.D.Raisinghania

5) Higher Engineering Mathematics by B. S.Grewal

5. BOTANY (OPTIONAL)

RANI CHANNAMMA UNIVERSITY, BELAGAVI
REVISED UG SYLLABUS V 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	
V Sem Paper-I Theory	Plant breeding, Tissue culture and Horticultural Practices	04 hrs.	03 hrs	04	10	03	03	80
Practicals		04 hrs.	04 hrs	10				40
Paper-II Theory	Ecology, Environmental Biology and Phytogeography.	04 hrs.	03 hrs	04	10	03	03	80
Practicals		04 hrs.	04 hrs	10				40

B.Sc. V Semester (w.e.f. 2019 – 20)
Botany Paper - I

Paper-I: Plant Breeding, Tissue Culture and Horticultural Practices. **50 Hrs**

Unit I: Plant Breeding: History and objectives. Introduction, Selection (Pure line, Mass Selection), Hybridization- inter specific and inter generic. Mutational & Polyploidy breeding. Germ plasm and its maintenance. Pollen Bank, Quarantine method.
10 Hrs.

Unit II: Plant Tissue Culture: Scope and Significance. Basic Aspects and Cellular totipotency (Shoot tip, Embryo and Haploid culture techniques). Differentiation and morphogenesis.
10 Hrs.

Unit III: Introduction to Horticulture, Nursery management and importance.

Methods of propagation – vegetative – rhizome, bulb, corm and sucker (natural). Artificial- Cutting, layering, grafting and budding. Bonsai – methods and importance. Nursery management: Introduction, types of nurseries and cultural practices. Seed (propagule) collection, storage and treatment. Manures, fertilizers and pesticides. Methods of irrigation – drip, sprinkler and flood
12 Hrs.

Unit IV: Green House Technology – Introduction, advantages and limitations. Types of Green Houses- Green House structure, principle Greenhouse technology as applied to ornamental, vegetable and fruit plants. **08 Hrs.**

Unit V: Harvest Technology and Weed Management: Harvest Technology: Flower and fruit plants management. Artificial ripening, maturity indices, methods of picking. Post-harvest technology and management of fruits: grading, processing, storage and packing. Weed Management: Introduction and significance. Invasive weeds – concept and causes of their dominance. Weed control – physical, chemical and biological methods. **10 Hrs.**

Practicals:

1. Study of methods of propagation with help of tubers, bulbs rhizomes, corms suckers, runner and offset.
2. Study of propagation by cutting, layering, grafting and budding.
3. Methods of emasculation and bagging for cross-pollination.
4. Morphology and anatomy of dry and wet stigma.
5. Morphology and anatomy of solid and hollow styles.
6. Study of pollination types.
7. Demonstration of tissue culture techniques.
8. Visit to nursery - poly house /Green house and tissue culture lab.
9. Preparation of MS media for culture. 10. Bonsai techniques.

Suggested Reading:

1. Chahal – Principles and procedures of plant breeding – L.B. Publication.
2. Sinha and Sinha – Cytogenetics, Plant Breeding and evolution- Vikas Publication.
3. Joshi P. – Genetic Engineering and its applications- Panima Book Distribution, Bangalore.
4. Purohit, S.S. -Molecular basis of cytoplasmic male sterility in crop plants.
5. Sawahel and Wagley, 1997- Plant Genetic Engineering- daya Publishing House, New Delhi.
6. Vyas S.P. and Kohi, D.V. - Methods in Biotechnology and Bioengineering – Daya Publishing House, New Delhi.
7. Vasil.IK. and Thorpe T.A. 1997- Plant cell and Tissue Culture – Kluwer Academic Publishers, The Netherlands.
8. Bhojwani S.S. 1990- Plant Tissue Culture: Applications and Limitation- Elsevier Science Publishers, New York.
9. Text Book of Horticulture – K. Manibhushan Rao – Macmillan India Ltd. 10. Introduction to Horticulture – N. Kumar (First Edition, Rajlakshmi Publication, 1996)   .

RANI CHANNAMMA UNIVERSITY, BELGAVI
Semester-V Botany Practical I (Plant Breeding, Tissue Culture & Horticultural Practices.)
Time: 4 Hours   Max Marks: 40

Q.1. Estimate the percentage of pollen viability in the given specimen **'A'**

08 Marks

Q.2. Carry out the Emasculation process in specimen **'B'** and describe the hybridization technique

(show it to the examiner)

08 Marks

Q.3. Demonstrate the vegetative propagation method **C,** and describe the procedure with diagram

(show it to the examiner)

07 Marks

Q.4. Identify & comment **D, E, F & G** specimens/ slides.

12 Marks

Q.5. Journal

05. Marks

Rani Channamma University, Belagavi. B.Sc V Semester Practical Examination
Instructions to Examiners.

Q.1. The percentage of pollen viability in the specimen **A.**

08 marks

(Preparation- 6 marks, tabulation and inference – 2marks)

Q.2. Emasculation process in Specimen **B**   08 marks

(Preparation-4 marks, description-2 marks, oral-2 marks).   .

Q.3. Vegetative propagation method **C** (cutting /Grafting/Layering)

07 marks

(Preparation-3 marks, diagram-1mark, description-2 marks, oral-1mark)

Q.4. Specimens/slides- **D, E, F** and **G**   12 marks.

(One each specimen/slide from pollination, tissue culture, type of stigma, type of style. Identification-1mark, description -2 marks).

Journal

05 marks.

B.Sc. V 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: Plant breeding: 02 sub questions.

From Unit II: Plant tissue culture: 02 sub questions.

From UnitIII: Introduction to Horticulture, Nursery management and importance-03 sub questions.

From Unit IV: Green House Technology-02 sub questions.

From Unit V: Harvest Technology and Weed Management: 03 sub questions

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

6X 5 = 30

From Unit I: Plant breeding: 01 sub question.

From Unit II: Plant tissue culture: 01 sub question.

From Unit III: Introduction to Horticulture, Nursery management and importance-03 sub questions.

From Unit IV: Green House Technology-01 sub question.

From Unit V: Harvest Technology and Weed Management: 02sub questions

Q. III Descriptive Answers.

21. a) From Unit I: Plant breeding: 01 sub question.

1 X 10 = 10

OR

b) From Unit II: Plant tissue culture: 01 sub question.

22. a) From Unit III:Introduction to Horticulture, Nursery management and importance -01 sub question.**1 X 10 = 10**

OR.

b) From Unit III: Introduction to Horticulture, Nursery management and importance-01 sub question.

23. a) From Unit V: Harvest Technology and Weed Management: 01sub question.

1 X 10 = 10

OR

b) From Unit V: Harvest Technology and Weed Management: 01sub question.

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

* * * * *

Semester V (w.e.f. 2019-20)

Botany Paper – II

Paper-II: Ecology, Environmental Biology and Phytogeography   **50 hrs**

Unit I: Plant and environment: Atmosphere (gaseous composition), water (properties of water cycle), light (global radiation, photo synthetically active radiation), temperature, soil (development, soil profiles, physico-chemical properties), and biota. Morphological, anatomical and physiological responses of plants to water (hydrophytes, xerophytes and epiphytes), temperature (thermoperiodicity and vernalization), light (photoperiodism, heliophytes and sciophytes) and salinity.   **12 Hrs.**

Unit II: Population ecology and Ecosystems: Growth curves; ecotypes; ecads, Ecological successionhydrach and xerarch. Structure of Ecosystems (Pond and Forest): abiotic and biotic components; food chain, food web, ecological pyramids, energy flow.
                                                   10 Hrs.

Unit III: Phytogeography: Botanical regions of world, Vegetation types of Karnataka and India.   **06 Hrs.**

Unit IV: Conservation of Natural resources: Different types of natural resources and their conservation, Forest and Forest Management: Forest and its ecological significance, deforestation, forest management and social forestry. Natural depletion of vegetation endangered and threatened economic plants of India and red data book. Wild life management in India, Indian board of wild life, national park and sanctuary. Energy resources: conventional and non-conventional sources of energy. Biodiversity: significance, types, depletion, conservation of biodiversity. **12 Hrs.**

Unit V: Pollution: Introduction, causes, effects and control measures of Water pollution, Air pollution, Soil pollution, Acid rain, Global warming, and Ozone depletion. Sewage water and waste water types. Methods of effluent treatment of industrial waste water, sludge disposal and   its care related to environment.   **10 Hrs.**

Practical:

1. Study of frequency and density of herbaceous plants by quadrat method.
2. To determine moisture content and water holding capacity of different types of soils.
3. To estimate the alkalinity of water samples.
4. Ecological instruments.
5. Morphology and anatomical adaptations in three hydrophytes.
6. Morphology and anatomical adaptations in xerophytes: One succulent and one non succulent, one epiphyte and one halophyte.
7. Waste water analysis, physical chemical parameter, pH, turbidity, TDS, BOD, COD, temperature and any other inorganic elements.
8. Visit to effluent treatment plant to study recycling of waste water near by industry and study the effect of industrial pollution nearby water bodies (Biomagnification& Eutrophication).

9. Assignment of Project related to practical number eight.

10. Study Tour of minimum two days to study forest types and ecological groups.

Books for Reference:

1. Sharma P.D. (1993)-Ecology and Environment – Rastogi Publication, New Delhi.

2. Mishra R. - Ecology Work Book- Oxford and IBH, New Delhi.

3. Agarwal K.C. (1993) - Environmental Bilogy- Agro Botanical Publishers, Jodhapur.

4. Mishra K.C. (1992) - Manual of Plant Ecology – Oxford & IBH Publication, New delhi.

5. Kochar P.L. (1980) – Plant Ecology – S. Nagin & Co., Jallandhar. 6. Kormandi E.J. (1984) –
         Concept of Ecology- Printice Hall Ind., New Delhi.

7. Asthana R.K. (1998) – Environmental Problems and Solution- S.Chand& Co. Pvt, Ltd., New Delhi.

8. Verma P.S., V.K. Agarwal (1983) – Environmental Biology - S.Chand& Co. Pvt, Ltd., New Delhi.

9. Subramanyam N.S. A.V.S.S. Samburthy (2000)- Ecology- Narosa Publishing House, New Delhi.

10. Sharma O.P. (1993) – Ecology & Environmental Biology- Rastogi Publication, Meerut.

11. Nebel B.J. (1990) – Environmental Science – Printice Hall Indu. Pvt. Ltd. New Delhi.

12. Trivedi R.K. Etal (1987) – Practical Ecology – Anmol Publication, Jodhapur.

13. Rao K.S. (1971) - Fundamentals of Ecology – W.B. Saunders co. Philadelphia.

14. Shukla R.S. &Chandel P.S. (2000) – Plant Ecology – S.Chand& Co. Pvt. Ltd., New delhi.

15. Odum, E.P 1983. Basic Ecology, Saunders, Philadelphia.

16. Mackenzie,A et al. 1999.Instant Notes in Ecology. Viva Books Pvt.Ltd Delhi.

17. For laboratory exercises

 a. Krebs, C.J. 1989. Ecological Methodology. Harper and Row, New York.

 b. Ludwig, J.A. and Reynolds, J.F. 1988. Statistical Ecology. Wiley. New York.

 c. Moore, P.W. and Chapman, S.B. 1986. Methods in plant Ecology. Blackwell scientific publications.

Semester-V Botany Practical II (Ecology, Environmental Biology and Phytogeography.)
Time: 4 Hours   Max Marks: 40

Q.1. Give the external and internal features of ecological adaptations with neat labelled diagrams of specimen- A and mention the habitat to which it belongs.
                                    08 Marks

Q.2. Determine the moisture content & water holding capacity of sample 'B'.
        05 Marks

Q.3. Analyse sewage & waste water sample- C (pH, turbidity, TDS,).
        06 Marks

Q.4.   a. Identify and describe the features of ecological interest in slide D.
        03 Marks
        b. Describe the use and working mechanism of ecological instrument E.
        03 Marks

Submission of Project (Industrial visit)
        05 Marks

Submission of Study tour report (Viva voce on Ecology/vegetation types studied during tour & project)
        05 Marks

Journal
        05 Marks

Rani Channamma University, Belagavi. B.Sc V Semester Practical Examination

Subject: Botany Paper- II Instructions to Examiners.   Time: 4Hours   Max Marks: 40

Q.1. Ecology specimen –A   08 marks

        (External and internal ecological adaptations- 5 marks, diagram-2 marks,
        mentioning habitat- 1mark)

Q.2. Moisture content /water holding capacity of sample –B   05 marks

        (Performing experiment and procedure-3 marks, calculation and result-2marks).

Q.3. Analysis of sewage and waste water sample -C.   06 marks

        (PH-2marks, turbidity-2marks, TDS-2marks).

Q.4. a-Ecological slide- D.   03 marks.

        (Identification -1mark, description -2 marks)
        b- Ecological instrument-E   03marks
        (Identification-1mark, working mechanism and use -2marks

Submission of project   05 marks.

Study tour report (Viva voce)   05
marks.
Journal   05
marks.

B.Sc.V 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 I: Plant and environment- 03 sub questions.
From Unit II: Population ecology and Ecosystems-04 sub questions.
From Unit III: Phytogeography-01 sub question.
From Unit IV: Conservation of Natural resources-02 sub questions.
From Unit V: Pollution-02 sub questions.
Q. II Answer any six out of eight (13 to 20 sub questions)   6X 5 = 30
From Unit I: Plant and environment- 02 sub questions.
From Unit II: Population ecology and Ecosystems-02 sub questions.
From Unit III: Phytogeography-01 sub question.
From Unit IV: Conservation of Natural resources-02 sub questions.
From Unit V: Pollution-01 sub question.
Q. III Descriptive Answers.
21. a) From Unit I: Plant and environment- 01 question.   1 X
10 = 10
OR
      b) From Unit II: Population ecology and Ecosystems-01 question.
22. a) From Unit III: Phytogeography-01 question.
         1 X 10 = 10
OR
      b) From Unit IV: Conservation of Natural resources-01 question.
23. a) From Unit V: Pollution-01 question.   1 X
10 = 10
OR
   b) 2 Short notes
   From Unit I: Plant and environment   &
   From Unit IV: Conservation of Natural resources -01 question each.   2 x
5 = 10

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

* * * *

5. COMPUTER SCIENCE (OPTIONAL)

Revised syllabus of BSc Computer Science (OPTIONAL) subject w.e.f. academic year 2017-18 and onwards

Subject Code	Subject Title	Teaching Scheme Hrs/week		Examination			
		Theory	Practical	Exam. Duration (Hrs)	Theory/ Practical	IA	Total
w.e.f. 2017-18 and onwards							
17BScCSCT11	Computing Fundamentals and Programming in C	4	--	3	80	20	100
17BScCSCP12	Programing Lab- C Lab	--	4	3	40	10	50
w.e.f. 2017-18 and onwards							
17BScCSCT21	Data Structures Using C	4	--	3	80	20	100
17BScCSCP22	Programing Lab-Data Structures Using C	--	4	3	40	10	50
w.e.f. 2018-19 and onwards							
17BScCSCT31	Digital Logic and Computer Design	4	--	3	80	20	100
17BScCSCP32	Programing Lab-Digital Logic	--	4	3	40	10	50
w.e.f. 2018-19 and onwards							
17BScCSCT41	Operating System Principles	4	--	3	80	20	100
17BScCSCP42	Programing Lab-Linux	--	4	3	40	10	50
w.e.f. 2019-20 and onwards							
17BScCSCT51	Relational Database Management System	4	--	3	80	20	100
17BScCSCP52	Programing Lab-SQL and PL/SQL lab	--	4	3	40	10	50
17BScCSCT53	Object Oriented Programming using Java	4	--	3	80	20	100
17BScCSCP54	Programing Lab- Java programming	--	4	3	40	10	50
w.e.f. 2019-20 and onwards							
17BScCSCT61	Data Communications and Computer Networks	4	--	3	80	20	100
17BScCSCP62	Programing Lab-Data Communication and Networking lab	--	4	3	40	10	50
17BScCSCT63	Web Programming	4	--	3	80	20	100
17BScCSCP64	Programing Lab-Web Programming Lab.	--	4	3	40	10	50

17BScCSCT51: Relational Database Management System	
Teaching Hours: 4 Hrs/week	**Marks: Main Exam: 80**
	IA: 20

Objectives: To introduce the concept of the DBMS with respect to the relational model, to specify the functional and data requirements for a typical database application and to understand creation, manipulation and querying of data in databases

Expected Learning Outcomes

· Understand relational data base management system concepts.

· Ability to evaluate business information problem and find the requirements of a problem in terms of data.

· Ability to design the database schema with the use of appropriate data types for storage of data in database.

· Ability to create, manipulate, query the database tables

UNIT I   10Hrs
Introduction: Purpose of Database Systems, View of Data, Database Languages, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Database Users and Administrators.

UNIT II   10Hrs
Introduction to the Relational Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations.
Formal Relational Query Languages: The Relational Algebra, the Tuple Relational Calculus, The Domain Relational Calculus.

UNIT III   10Hrs
Database Design and the E-R Model: Overview of the Design Process, The Entity-Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues, Extended E-R Features. Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Algorithms for Decomposition, Decomposition Using Multivalued Dependencies, More Normal Forms-2NF,
3NF, refinement, BCNF, and 4NF, Database-Design Process, Modelling Temporal Data.

UNIT IV   10Hrs
Data Storage: Overview of Physical Storage Media,   Magnetic Disk and Flash Storage,   RAID, File Organization, Organization of Records in Files, Data-Dictionary Storage, Database Buffer, Indexing and Hashing concepts, Ordered Indices, B+-Tree Index Files, Multiple-Key Access,   Static Hashing, Dynamic Hashing, Bitmap Indices.

UNIT V   10Hrs
Transactions and concurrency control: locking, time stamping and data recovery.
Introduction to SQL: SQL Data Definition, Basic Structure of SQL Queries, Basic Operations- Set Operations, Null Values, Aggregate Functions, Nested Subqueries, Modification of the Database, Join Expressions,   Views,   Transactions,   Integrity   Constraints,   SQL   Data   Types   and Schemas,   Authorization.

Advanced SQL: Accessing SQL from a Programming Language, Functions and Procedures, Triggers, Recursive Queries.

References:
1. Abraham Silberschatz, Henry F. and S. Sudarshan, Database System Concepts, 6th edition, Mc Graw Hill.
2. Coronel, C. M., Morris, S. & Rob, P., Database systems: Design, implementation, and Management (10th ed.). Boston: Cengage Learning
3. Elmasari & Navathe, Fundamentals of Database System, Pearson Education
4. Feuerstein, Oracle PL/SQL Programming, SPD/O'REILLY

Additional Reading:

5. Korth, Data Base System Concepts, TMH
6. Bipin Desai, An introduction to Database System, Galgotia Publications
7. S. K. Singh, Database System: concept, Design & Application, Pearson Education
8. P.S. Deshpande, SQL PL/SQL for Oracle 8 & 8i, Wiley Dreamtech

17BScCSCT52: Programming Lab- SQL and PL/SQL Lab.	
Practical Hours: 4 Hrs/week	**Marks: Main exam: 40**
	IA: 10

1. Draw E-R diagram and convert entities and relationships to relation table for a given scenario.
   a. Two assignments shall be carried out i.e. consider two different scenarios (eg. bank, college)
2. Write relational algebra queries for a given set of relations.
3. Perform the following:
   a. Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)
4. Perform the following:
   a. Altering a Table, Dropping/Truncating/Renaming Tables, Backing up / Restoring a Database.
5. For a given set of relation schemes, create tables and perform the following
      Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregate functions (group by and having clause), Queries involving- Date Functions, String Functions , Math Functions
      Join Queries- Inner Join, Outer Join
      Subqueries- With IN clause, With EXISTS clause

6. For a given set of relation tables perform the following
   a. Creating Views (with and without check option), Dropping views, Selecting from a view
7. Write a Pl/SQL program using FOR loop to insert ten rows into a database table.
8. Given the table EMPLOYEE (EmpNo, Name, Salary, Designation, DeptID) write a cursor to select the five highest paid employees from the table.
9. Illustrate how you can embed PL/SQL in a high-level host language such as C/Java and
   demonstrates how a banking debit transaction might be done.
10. Given an integer i, write a PL/SQL procedure to insert the tuple (i, 'xxx') into a given relation.

SQL and PL/SQL tutorial: https://www.w3schools.com/sql/, http://www.plsqltutorial.com/

RANI CHANNAMMA UNIVERSITY, BELAGAVI

17BScCST53: Object Oriented Programming using Java	
Teaching Hours: 4 Hrs/week	**Marks: Main Exam: 80**
	IA: 20

Objective: To provide comprehensive study on object oriented paradigm and concepts. Efficiency in computer programming using Java.

Expected Learning Outcomes:

· Understand the basic concepts of object orientation.

· Understand the syntax of JAVA

· Ability to program using object oriented concept.

UNIT I 10Hrs

Fundamentals of Object Oriented Programming(OOP), difference between Procedural and Object oriented programming , basic OOP concept - Object, classes, abstraction, encapsulation, inheritance, polymorphism .
History of Java, features of Java, JDK Environment, Java Virtual Machine, Java Runtime environment.

UNIT II 10Hrs

Identifiers and Keywords, data types, Java coding Conventions, expressions, control structures, decision making statements, Arrays and its methods, Garbage collection & finalize() method.
Java classes, define class with instance variables and methods, object creation, accessing member of class, argument passing, Constructors, Method overloading, static data, static methods, static blocks, this keyword, Nested & Inner classes, Wrapper Classes, String (String Arrays, String Methods, StringBuffer)

UNIT III 10Hrs

Inheritance: Super class & subclass, abstract method and classes, method overriding, final keyword, super keyword, down casting and up casting, dynamic method dispatch.
Packages and Interfaces: Importing classes, user defined packages, modifiers & access control (Default, public, private, protected, private protected), implementing interfaces, user defined interfaces, Adapter classes

UNIT IV 10Hrs

Exception handling: Types of Exceptions, try, catch, finally, throw, throws keywords, creating your own exception, nested try blocks, multiple catch statements, user defined exceptions.
Java Input Output: Java IO package, File, Class Byte/Character Stream, Buffered reader / writer, File reader / writer Print writer File Sequential / Random Serialization and de serialization.
Multithreading: Multithreading Concept, thread life cycle, creating multithreading application, thread Priorities, thread synchronization, and inter thread communication

UNIT V 10Hrs

Abstract Window Toolkit: Components and Graphics, Containers, Frames and Panels, Layout Managers, AWT all Components, Event Delegation Model, Working with Graphics and Text.

References:
1. Herbert Schildt, The Java 2 : Complete Reference, Fourth edition, TMH,
2. Balaguruswamy, Programming with JAVA, A primer, TATA McGraw-Hill Company.

3. Cay S Horstmann, Fary Cornell, Core Java 2 Volume – I and II, Sun Microsystems Press
4. *https://docs.oracle.com/javase/tutorial/*

Additional Reading:

5. Peter Van der Liden, Just Java, Prentice Hall
6. H. M. Deitel, P. J. Deitel, Java: how to program, 5th edition, Prentice Hall of India.


17BScCSCP54: Programming Lab- Java programming	
Practical Hours: 4 Hrs/week	**Marks: Main exam: 40**
	IA: 10

Students are encouraged to use Linux-Open Source OS for executing java –programs using javac compiler available in Linux.

1. Define a class that will hold the set of integers from 0 to 31. An element can be set with the set member function and cleared with the clear member function. It is not an error to set an element that's already set or clear an element that's already clear. The function test is used to tell whether an element is set.
2. Write a Java program that creates an object and initializes its data members using constructor. Use constructor overloading concept.
3. Write your own simple Account class. You should be able to make deposits and withdrawals and read out the balance — a private double variable. Member functions should be: void Account::withdraw (const double &amount); //Take from account void Account::deposit(const double &amount); // Put into account double account::balance(void); //Return the balance Make sure that the Account constructor function initialises the balance to zero. If you like, add an overloaded constructor function to set an initial balance.
4. Write a derived class DepositAccount that inherits from the Account class. The account should pay interest at an annual rate that is private member data, but impose a £10 fee for every withdrawal. You should overload the member functions of Account where necessary. How will you determine when to pay interest?
5. Write a java program to calculate gross salary & net salary taking the following data. Input: empno, empname, basic   Process: DA=50%of basic   HRA=12%of basic   CCA=Rs240/-   PF=10%of basic   PT=Rs100/-
6. Write a Java program to sort the elements using bubble sort.
7. Write a Java program to search an element using binary search.
8. Write a Java program that counts the number of objects created by using static variable.
9. Write a Java program to count the frequency of words, characters in the given line of text.
10. Write a java program to find the details of the students eligible to enroll for the examination (Students, Department combined give the eligibility criteria for the enrolment class).
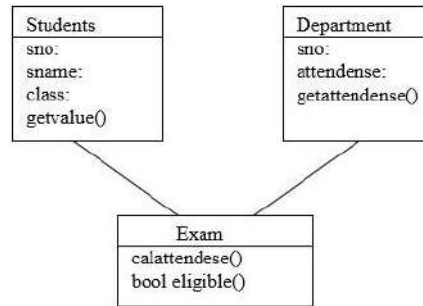
11. Write a java program to identify the significance of finally block in handling exceptions.
12. Write a java program to access member variables of classes defined in user created package.
13. Write a Java Program to implement multilevel inheritance by applying various access controls to its data members and methods.
14. Write a Java Program to implement Vector class and its methods.
15. Write a program to demonstrate use of user defined packages.
16. Write a java program to implement exception handling using multiple catch statements.
17. Design stack and queue classes with necessary exception handling. Test the classes by writing a tester program.
18. Write a Java program to illustrate AWT controls frame, panel, layout manager, command button and text boxes.
19. Write a Java program to illustrate basic calculator using grid layout manager.
20. Illustrate creation of thread by extending Thread class
21. Illustrate thread creation by implementing runnable interface.

7. 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
V Sem	Paper - I : ANOVA, Design of Experiments and SPRT	5 Hours	Theory – 80 IA – 20	Prescribed in the Syllabus.
	Paper – II : Sampling and Demography	5 Hours	Theory – 80 IA – 20	Prescribed in the Syllabus.

FIFTH SEMESTER: THEORY PAPER-I   Total: 50 Hours.

ANOVA, DESIGN OF EXPERIMENTS AND SPRT.

Unit 1: Analysis of Variance:

Meaning and assumptions. Analysis of variance (fixed effects model) - Analysis of one-way, two-way classified data, expectation of mean sum of squares, ANOVA tables. Least significant difference. Case of multiple but equal number of observations per cell in two-way classification (with interaction). Three way classification   10 Hours

Unit 2: Design of Experiments:

Definitions of important terms in design of experiments and Basic principles. Completely randomized, Randomized block and Latin square designs-layout, models, least squares estimates of parameters, hypothesis, test procedures and ANOVA tables. Efficiency of design. Missing plot technique for RBD and LSD-Estimation of single missing observation.   15 Hours

Unit 3: Factorial Experiments:

 2^2 and 2^3 factorials. Main effects and interactions, their best estimates and orthogonal contrasts.

Yates methods of computing factorial effects . Total, partial confounding in a 2^3 experiments in a RDB layout.   10 Hours

Unit; 4 Split- plot design

Introduction, Definition and examples of Split-Plot design. Analysis of Split-Plot design and complete ANOVA table for a split- plot design. Advantages and disadvantages of spilt- plot design.

                                        05 Hours

Unit 5: Sequential Testing:

Need for sequential tests. Wald's SPRT, Graphical procedure of SPRT. Determination of stopping bounds. Construction of SPRT for Binomial, Poisson, Normal distributions.

Approximate expressions for OC and ASN functions for Binomial, Poisson and Normal distributions.   10 Hours

FIFTH SEMESTER: PRACTICAL PAPER-I

STPR-5.1: PRACTICALS

2. ANOVA for one way classified data.

3. ANOVA for two way classified data: Single observation per cell

4. ANOVA for two way classified data: multiple but equal number of observations per cell

    (assuming interaction)

5. Analysis of CRD, RBD and LSD and efficiency.

6. Missing plot technique for RBD and LSD with single observation missing.

7. Analysis of 2^2 factorial experiment

8. Analysis of 2^3 factorial experiments.

9. Exercises on SPRT (Bernoulli, Binomial, Poisson &Normal distributions)

Books for study:

1. Cochran.W.G. and G.M.Cox: Experimental Designs-John Wiley.

2. Goon A.M et.al: Fundamentals of Statistics, Vol. II- World Press, Calcutta.

3. Gupta S.C and VK Kapoor: Fundamentals of Applied Statistics- Sultan Chand & Sons.

4. Montgomery.D.C: Design and analysis of experiments: Wiley

5. A.Wald: Sequential Analysis-Wiley.

6. Parimala Mukhopadhyay-Applied Statistics.

Books for Reference:

1. Das M.N. and Giri.N: Design of Experiments: Theory and Applications.

2. Joshi.D.D.Linear estimation and Design of Experiments: New-Age International.

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

FIFTH SEMESTER: THEORY PAPER-II   Total: 50 Hours.

SAMPLING AND DEMOGRAPHY.

Unit: 1. Introduction:

Concepts of population and sample. Need for sampling. Complete enumeration vs Sample surveys. Non probability and probability sampling; meaning, need and illustrations . Use of random numbers .Principal steps in a sample survey. Requisites of a good questionnaire. Pilot surveys. Sampling and non sampling errors.   10 Hours

Unit: 2.Simple Random Sampling:

Sampling with and without replacement. Unbiased estimators of population mean and total. Derivation of sampling variance .Standard errors of the estimators. Derivations of variances of the estimators and their estimation . Determination of sample size .Formulas for sample size in sampling for proportions and means.   10 Hours

Unit: 3.Stratified Random Sampling:

Need for stratification unbiased estimator of mean and total in stratified random sampling. Derivation of the SE's and their estimation. Allocation of sample size under proportional, Optimum and Neyman allocation. Comparison of V (ran), V(prop) and V (opt) ignoring f p c. Estimation of gain in precision due to stratification   10 Hours

Unit: 4.Systematic Random Sampling:

Unbiased estimator of population mean and its variance.Expression of variance with intra class correlation. Systematic sampling with linear trend. Comparison of systematic sampling with simple and stratified random sampling procedure.   10 Hours

Unit: 5. Demography and life tables:

Sources of demographic data. Measurement of Mortality: Crude, Specific and Standardized death rate, Infant mortality rate, Neonatal mortality rate and maternal mortality rates. Fecundity and fertility. Measurement of fertility: Crude, Age specific, General and Total fertility rates

Reproduction rates - NRR and GRR. Life table: Definition and uses, components of life table, Explanation of the columns of life table. Abridged life table- King's method.   10 Hours.

FIFTH SEMESTER: PRACTICAL PAPER-II

STPR-5.2: PRACTICAL

1. Drawing random samples using random number tables(grouped and ungrouped cases)

2. Simple Random Sampling.

3. Stratified sampling- I: Estimation of mean, total and the standard error of the estimators.

4. Stratified sampling -II

5. Systematic sampling –Sampling mean and its relative comparisons.

6. Demography –I: Measurement of mortality, infant mortality, standardized death rates.

7. Demography- II: Measurement of fertility, ASFR, TFR and reproduction rates.

8. Demography- III: Construction of life-tables.

Books for study:

1. Cochran.W.G.Sampling Techniques (3 rd Ed)-Wiley Eastern.

2. Singh and Chaudhary,F.S. (1986): Theory and Analysis of Sample survey design

(Wiley Eastern).

3. Goon A.M et.al: Fundamentals of Statistics, Vol. II- World Press, Calcutta.

4. Gupta S.C and Kapoor V.K.: Fundamentals of Applied Statistics- Sultan Chand &

Sons publications.

5. Srivastava .O.S (1983); A Text book of Demography-Vikas Publishing.

6. Cox.P.R(1970);Demography,Cambridge University Press.

Books for Reference:

1. Das M.N.: Sampling Theory and Methods-Statistical society,ISI,Kolkata.

2. Des Raj and Chandak; Sampling Theory-Narosa,New Delhi.

3. Sukhatme P.V.et.al: Sampling Theory of surveys with applications-Indian Society of

Agricultural Statistics,New Delhi.

■■

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 X 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 X 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 X 4 = 40 marks.

8. ZOOLOGY (OPTIONAL)

BSc-Zoology (Optional) Fifth Semester

Paper 5.1 and 5.2 Outline

STRUCTURE

Semester	Syllabus	Hour's
V Paper I	Ecology, Evolution, Paleontology, Zoogeography & Wild life Conservation	50
V Paper -II	Genetics, Biotechnology & Biostatistics	50

(Ecology, Evolution, Paleontology, Zoogeography, Wild life Conservation)

Total-hours,50

Marks-80

Ecology.

Earth as Living.-Planet. Sub divisions_of ecology, Scope of ecology, Biosphere

1 hr

Abiotic factors ___
 Light, Temperature (Effect on Animals and Plants)

2hr

Biotic Factor

Mutualism,Commensalism,Amensialism,Parasitism,Predation

2hrs

,Compitition,Parasitism.

Habitats

4hrs

Freshwater habitat — Lotic and Lentic systems
Zonation of Sea,Marine Biota, Esturine ecology, & Mangrooves
Terrestrial habitat — A brief account of Biomes.

Ecological Adaptations — Freshwater, Marine and Terrestrial.

Biogeochemical Cycles - Principles and concepts of   Water, Nitrogen, Carbon,

2hrs

Oxygen cycles

Community Ecology-Community structure, Ecological niches, Edge effect, Stratification, Ecoton.

2hrs

Population Ecology: Density, natality, mortality.Age distribution

Population growth, types and curves.

2hrs

Evolution.

The Solar System
Origin of Earth , Origin of Life and its theories

03hrs

The geological time scale

03hrs

Fossils: Definitioni and Kinds of fossils, How fossils are formed, Methods of Preservation. Connecting links and Living fossils. The importance of fossils

02hrs

Theories of Organic Evolution :

06hrs

Lamarkism, Darwinism, Mutation Theory
And the Modern Synthesis Theory;(population gene Pool, Gene Frequencey . Variations — gene mutation, chromosomal mutation; Isolation and   recombination.Genetic drift,Hardiwienberg equilibrium)

Modes of Evolution : Microevolution, Macroevolution and Mega-evolution.

02 hrs

,Evolution of Man and Horse   04 hrs

Paleontology
 Mesozoic reptiles with a note on Dinosaurs.

03 hrs

Zoogeography: Zoogeographical realms of world ,
A brief account of Wallace's line

03 hrs

Wildlife Conservation :   09hrs
Wildlife in India,Causes for the depletion of wildlife.
Wild Life Conservation Techniques', methods'and measures
Brief account of ; IUCN, WWF,Bombay Natural History Society,
Indian Board for Wild Life, Red Data Book.
Wild Life Act 1972 and its amendments in India,CITES.
Project Tiger and Biosphere Reserve.

Total -11 Practicals

1; Study of fossils (vertebrate(3) and invertebrate(3).
     1hrs

2. Mesozoic reptiles (Ichthyosaur, tyrannosaur, brontosaur, triceratops,
     archaeopteryx .
     1hr
3. Evolution of man (Homo-erectus. Hemo-habills. Homo-neandertalences)
     1hr
4. Evolution of Horse
     1hr
5 ;Connecting links and living fossils (Neopilina, Peripatus, Limulus, Latimaria;
 Archaeopteryx and   Duckbill platypus)
     1hr
6 Study of threatened Animals of India (Tiger,Lion,singal horned rhinoceros
     1hr
   Musk deer,gaur,Golden langur,Loin tailed monkey.Python)
     1hr
7 ;Estimation of CO_2 from different water samples
     1hr
8; Estimation of dissolved oxygen
     1hr
9; Estimation of Total hardness
     1hr
10;Study of Ecological Adaptations and Morphological peculiarities,;ex-Hermit
crab, 1hr
    Draco,Stick insect,puffer fish,Exocoetus,Phrynosoma,chamaeleon and Bat.
11;Visit to nearby water body to study Ecosystem
     1hr

REFERENCE BOOKS:-

Evolution : Odum

Organic Evolution: N.Arumugam
Evolution, Dobzhansky, Ayala,Stebbins & Valantine
Environmental Biology.Rastogi and Company,Meerut
Evolution of the Vertebrates, Colbert E.H. John Wiley and Sons, New York
Ecology;Principles and Application.chapman,Cambridge university press
Environmental Biology P.R.Trivedi and gurudeep Raj.
Recent Advances in Environmentai Biology –Diwan and D.K.Arora
Environmental Science;Eldon.D.Enger andBradly.F,Smith

Suggestions for Practical Examination

<u>SEM — V-5.I</u>

Q. NO I) Estimation of Carbondioxide/O xgen/Total hardness

    8marks

Q.NO II) Evolution (Two spottings)

4 marks

Q NO III) Fossils   (Two spottings)

4 marks

Q NO IV) Identification (Zoogeography & Wild life)

4 marks

Q NO V)· Project on Local Biodiversity

10 marks

Q NO. VI Viva

5 marks

Q NO. VII Journal

5 marks

<u>Note 1</u> :- 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. 1	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 IIIrd IVth & Vth each should have one internal option

B Sc V Semester-5.2
Paper-II
ZOOLOGY (optional)
(Genetics, Biotechnology and Biostatistics)

Total hours-50

Marks-80

Theory 4hrs/week

Genetics

Introduction_ Mendel and his contribution, Monohybrid and
4hrs

Dihybrid_cross (Laws),Definition of genetical Terminologies.

Interaction of Gene's :
5 hrs

Supplementary Factors ; Comb, Pattern in fowls.
Dominant Epistasis;- Plumage colour in Leghorn and Wyandote
Recessive Epistasis: Coat colour in sweet peas.
Complimentary Factors – Flower colour in sweet peas
Lethal gane – Coat colour in mice.

Multiple alleles: ABO blood group and Rh factor in human
2 hrs

Linkage and Crossing Over - Linkage in Drosophila, Significance
2 hrs
of Crossing over.

Sex Determination: Chromosomal mechanism of sex determination
3 hrs
Genic balance theory, Gynandomorphs., and intersexes.
Syndromes in human __ Klinefelter and Turners
Environmental and hormonal effects on determination of sex

Sex Linked Inheritance in Drosophila and Man
3 hrs
Haemomphilia and colour blindness in Man
Sex linkage in poultry.
Y - linked genes in man

Mutations – Chromosomal aberrations, Molecular basis of gene mutation & types
2 hrs

Human Genetics :
2 hrs

   Human Genetic disorders __ inborn errors of metabolism, Albinism, Phenyl ketonuria, Alkaptonuria, Sickle cell aneamia, Thalassemia. Huntington's Chorea

Genetic Code and Protein Biosynthesis: Properties of genetic code and Mechanism of biosynthesis. Wooble hypothesis.
   3 hrs

Biotechnology

Introduction Sub-fields of biotechnology history of biotechnology
1 hr
            Biotechnology Scenario in India

Types of Biotechnology: Animal Biotechnology. Plant Biotechnology Microbial
2 hrs
Biotechnology. Environmental Biotechnology Medical Biotechnology

Molecular biotechnology Genetic engineering, isolation of DNA, Gene cloning
6 hrs
Vectors, Restrictiction enzymes- Polymerase Chain Reaction (PCR)
DNA finger printing

Applications of Biotechnology
5 hrs

Agricultural application: Improvements in crop yield

Industrial application: Ethanol production, Food processing, Food fermentors and
            Industrial enzymes.

Environmental Applications: Cleaning up of environmental pollutants, Bioremediation.

Medical Applications: Gene testing, Gene therapy, Drug discovery Diagnosis of inherited
          Disorders, personal identification.

Biostatistics

Fundamentals of Biostatistics

10 hrs

Preliminary Concepts.
Frequency distribution
Graphical presentation of Data
Measures of Central Tendancy- Mean, Median and Mode
Measures of variation
P r o b a b l i t y
Chi-Square Test

Practicals

1. Study of human karyyotype and disorders

   03

2. Problmes based on monohybrid, dihybrid, sex linked inheritance,

   02

   Multiple allels

3. Calculation of gene frequency

   01

4. Study of blood groups

   01

5. Study of Paper Chromatography

   01

6. To form frequency distribution table & draw histograme frequency

   Polygon & frequency curve

   01

7. Measures of central tendency (range, mean, mode and median)

   01

8. Isolation of DNA / RNA

01

9. Preparation of Giant Chromosome-Drospphila Salivary gland chromosomes

01

Suggestions for Practical Examination

SEM __ V-5.2

Q No. I) Genetics : (A) One Karyotype analysis

07 marks

(B) Three problems

09 marks

No. II) Biotechnology

07 marks

Q No. III) Biostatistics

07 marks

No. IV   Viva

05marks

No. V Journal

05 marks

Note 1 :- Examiner 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 : <u>Question paper pattern for **THEORY** examination</u>

Q No. 1	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 IIIrd, IVth & Vth each should have one internal option.

MICROBIOLOGY

SEMESTER- V

PAPER 5.1 ENVIRONMENTAL MICROBIOLOGY

Total Hours Allotted: 50

1. **Introduction:**

   Soil, water and air as habitats for microorganisms, microbial populations in the above habitats.

   2-Hours

2. **Aerobiology:**
   a) Air pollution- Sources, Types, Effects, Control. Ozone Layer Depletion.
   b) Micro flora of indoor & Outdoor environment, Factors affecting air micro flora, management of airborne microbes.
   c) Techniques of trapping airborne Microorganisms: Gravity Slide, Petri plate exposure, liquid impingement, Sieve device & Filtration.
   d) Air borne Diseases, allergens, pathogens .Control of airborne microorganisms.

   14- Hours

3. **Aquatic Microbiology:**
   a) Water pollution- Sources, Types, Effects, Control.
   b) Water borne diseases- Viral –Jaundice.

      Bacterial- Cholera.

      Protozoan- Amoebic dysentery.

      Biological indicators of water pollution.

   c) Determination of sanitary quality of water: SPC tests for Coli Forms, MPN, IMViC reactions, membrane filter technique.
   d) Water purifications in municipal water supply.

   14- Hours

4. **Microbiology of waste water:**
   a) Introduction: Sources of waste water-(Domestic, Agricultural, Industrial).
   b) Physical, Chemical & Microbiological characteristics of waste water.
   c) Waste water treatment – Municipal waste water treatment- Primary (Screening, Coagulation, Sedimentation) Secondary (Trickling Filter, Activated sludge process, Osmosis, Oxidation pond) Tertiary (Reverse Ion exchange method & Dialysis)
   d) Waste as a resource (Organic compost): Biogas production and Composting.

   22-Hours

5. **Bioleaching:**
   a) Scope of bioleaching
   b) Organisms involved economic importance.
   c) Mechanism of bioleaching of Cu and Fe.

   4-Hours

6. **Bioremediation:**
   a) Role of microbes in abatement of heavy metal Pollution.
   b) Different microbial groups in bioremediation of environment.
   c) Biodegradation of Petroleum (Hydrocarbon), Pesticides (2, 4-D & DDT).

   4-Hours

   PRACTICAL-5.2 ENVIRONMENTAL MICROBIOLOGY

   1. Isolation of air borne microorganisms by Petri plate exposure method.
   2. Microscopic observation of different water samples.
   3. Bacterial examination of water.
      a) Test for Coli forms

b) Determination of MPN of Coliforms.
4. Estimation of solids in sewage.
5. Isolation & enumeration of microorganisms from different water samples by Serial dilution & pour plate method.
6. Estimation of dissolved oxygen in water sample.
7. Demonstration of sewage treatment plants- Trickling filter, Imhoff tank, Septic tank.
8. Display of photographs of water purification process-(Baffles flocculator, Clarifier, Sand filter, chlorinometer and chloroscope).

Note: Visit to water treatment plant / Sewage treatment plant. Report should be written and submitted along with practical record.

REFERENCES:

1. Alexander, M. "Introduction to Soil Microbiology" Wiley Estern Ltd., New Delhi.
2. Colowd . D. 1999 " Microbial Diversity" Academic press.
3. Hurst, G.H. " Environmental Microbiology" ASM Press Washington D.C.
4. Pleczar, M.J Chan, E.C.S and Krieg, N.R.- 1982 " Microbiology" Tata MaGraw Hill Book Co. New York.
5. Prescott. Lansing, M. ,Harley John P and Klein Donald, A " Microbiology" WBC. McGraw Hill New York.
6. Ralph Mitchell 1995 " Environmental Microbiology" Wiley and Sons. New York.
7. Salle. A.J. "Fundamental Principles of Bacteriology'' Tata McGraw Hill Publishing Company Ltd. New Delhi.
8. Sha D.S. And S.K. DwivedI Environmental Microbiology and Biotechnology, New Age Publishers.
9. Stenier R. Y. Ingra ham J.L. "General Microbiology" Prentice Hall of India Pvt. Ltd. New Delhi.
10. Subbarao. N.A. "Soil microorganisms and Plant growth " Oxford and 1BH publications co. New Delhi.

PAPER-5.3: <u>SOIL AND AGRICULTURE MICROBIOLOGY</u>

Total hours allotted: 50

1. **Microbiology of Soli:**
   a. Introduction: Types, soil profile, physical and chemical characters.
   b. Soil Microorganisms: Bacteria, Fungi, Actinomycetes, Algae, Protozoa and viruses.
   c. Role of Microorganisms in soil process: Biogeochemical Cycles- Carbon, Nitrogen, Sulphur and Phosphorous.
   d. Rhizosphere microflora and its role in the rhizosphere.
   e. Role of microorganisms in composting and humus formation.
   f. Interactions among microorganisms and Plants.

   16-Hours

2. **Microorganisms in Agriculture:**

   a.Nitrogen fixing - Azotobacter, Rhizobium, and Azospirillum.

   b. Phosphate Solubilizing Microorganisms

   c. Biochemistry of symbiotic and non- symbiotic nitrogen fixation.

   d. Mass production of bioinoculants (Rhizobium, Azotobacter, Azospirullum and Cyanobacteria) mode of applications and merits.

   e. Biopesticides: Types Bacterial (*Bacillus thuringiensis*), Fimgal (Trichoderma) mode of action factors influencing and target pests. **22-Hours**

3. **Microbes as Plant Pathogens:**
   A brief account of the causative agents, Symptoms and control of the following plant diseases- Bacterial (*Xanthomonas citri*), Fungal (Puccinia, Plasmopara,Cercospora,), Mycoplasma(Sandal spike, Grassyshoot), Viruses(TMV,Tomato leaf curl)

   12-Hours

PRACTICAL-5.3 SOIL AND AGRICULTURE MICROBIOLOGY

1. Isolation and enumeration of bacteria and fungi from Rhizosphere and Rhizoplane.
2. Isolationof Rhizobium from Legume or root nodules.
3. Isolation of Azotobacter from soil.
4. Isolation and identification of *Xanthomonas citri* from infected sample.
5. Study of plant pathogens- Tikka disease, sandal spike,Tomato leaf curl.
6. Isolation of Phosphate solubilizing bacteria from soil.

REFERENCES:

1. Alexander, M. "Introduction to Soil Microbiology" Wiley Estern Ltd., New Delhi.
2. Brock. T.D "Principles and microbial ecology" Prentice Flaial publishing company Philadelphia.
3. Colowd . D. 1999 " Microbial Diversity" Academic press.
4. Metrotra, R.S. "Plant pathology" Tata Mc Graw Hill Publication, New Delhi.
5. Pleczar, M.J Chan, E.C.S. and Krieg, N.R.-1982 " Microbiology" Tata MaGraw Hill Book Co. New York.
6. Prescott. Lansing, M. ,Harley John P and Klein Donald, A " Microbiology" WBC. McGraw Hill New York.
7. Rangaswamy, G. 1996 Diseases of crop in India. 3rd end. Prantice Hall of India Pvt. Ltd. New Delhi.
8. Salle. A.J. "Fundamental Principles of Bacteriology" Tata McGraw Hill Publishing Company Ltd.New Delhi.
9. Sha D.S. and S.K. Dwivedl Environmental Microbiology and Biotechnology, New Age Publishers.
10. Steward W.D.P Nitrogen Fixation in Plants. The Althione Press London.
11. Subbarao. M.S.1986 "Soil microorganisms and plant growth "3rd edn. Oxford & IBM Publication Co .New Delhi.

****