
# शहीद महेन्द्र कर्मा विश्वविद्यालय, बस्तर, जगदलपुर (छ.ग.)

**SHAHEED MAHENDRA KARMA VISHWAVIDYALAYA, BASTAR**
**JAGDALPUR (C.G.)**

# SYLLABUS

# B.Sc. PART-III

# SESSION 2021-22

शहीद महेन्द्र कर्मा विश्वविद्यालय, बस्तर, जगदलपुर (छ.ग.)
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## बी.ए./बी.एससी./बी.कॉम./बी.एच.एससी भाग–तीन,
## आधार पाठ्यक्रम
## प्रश्न पत्र–प्रथम
## हिन्दी भाषा

**पूर्णांक– 75**

**इकाई–एक** (क) भारत माता : सुमित्रानंदन पंत

(ख) कथन की शैलियाँ

1. विवरणात्मक शैली
2. मूल्यांकन शैली
3. व्याख्यात्मक शैली
4. विचारात्मक शैली

**इकाई–दो** (क) सूखी डाली : उपेन्द्रनाथ अश्क

(ख) विभिन्न संरचनाएँ

1. विनम्रता सूचक संरचना
2. विधि सूचक संरचना
3. निषेध परक संरचना
4. काल–बोधक संरचना
5. स्थान–बोधक संरचना
6. दिशा बोधक संरचना
7. कार्य–कारण सम्बन्ध संरचना
8. अनुक्रम संरचना

**इकाई–तीन** (क) वसीयत : मालती जोशी

(ख) कार्यालयीन पत्र और आलेख

1. परिपत्र
2. आदेश
3. अधिसूचना
4. ज्ञापन
5. अनुस्मारक
6. पृष्ठाकंन

**इकाई–चार** (क) योग की भाक्ति : हरिवंश राय बच्चन

(ख) अनुवाद : स्वरूप एवं परिभाषा, उद्देश्य स्त्रोत भाषा और लक्ष्य भाषा, अच्छे अनुवाद की विशेषताएँ, अनुवाद प्रक्रिया, अनुवादक

**इकाई–पांच** (क) संस्कृति और राश्ट्रीय एकीकरण : योगेश अटल

(ख) घटनाओं, समारोहों आदि का प्रतिवेदन, विभिन्न प्रकार के निमंत्रण पत्र।

**मूल्यांकन योजना :** प्रत्येक इकाई से एक–एक प्रश्न पूछा जाएगा। प्रत्येक प्रश्न में आंतरित विकल्प होगा। प्रत्येक प्रश्न के **15** अंक होंगे। इसलिए प्रत्येक प्रश्न के दो भाग 'क' और 'ख' होंगे एवं अंक क्रमशः **8 एवं 7** अंक होंगे। प्रश्नपत्र का **पूर्णांक 75** निर्धारित है।

**B.A./B.Sc./B.Com./B.H.Sc. Part III**
**Foundation Course**
**English Language**

**M.M. 75**

The question paper for B.A./B.Sc./B.Com./B.H.Sc. III Foundation course, English Language and General Answers shall comprise the following items : Five question to be attempted, each carrying 3 marks.

| | | |
|---|---|---|
| **UNIT-I** | Essay type answer in about 200 words. 5 essay type question to be asked three to be attempted. | **15** |
| **UNIT-II** | Essay writing | **10** |
| **UNIT-III** | Precise writing | **10** |
| **UNIT-IV** | (a) Reading comprehension of an unseen passage | **05** |
| | b) Vocabulary based on text | **10** |
| **UNIT-V** | Grammar Advanced Exercises | **25** |

**Note:** Question on unit I and IV (b) shall be asked from the prescribed text. Which will comprise of popular create writing and the following items. Minimum needs housing and transport Geoeconomic profile of M.P. communication Educate and culture. Women and Worm in Empowerment Development, management of change, physical quality of life. War and human survival, the question of human social value survival, the question of human social value, new Economic Philosophy Recent Diberaliation Method) Demoration decentralization (with reference to 73, 74 constitutional Amendment.

**Books Prescribed:**

Aspects of English Language and Development-Published by M.P. Hindi Granth Academy, Bhopal.

## SULLABUS FOR ENVIRONMENTAL SRUDIES "FOR UNDER FRADUATE COURSES"

1. इन्वाहरमेन्टल साईंसेस के पाठ्यक्रम को स्नातक स्तर भाग–एक की कक्षाओं में विश्वविद्यालय अनुदान के निर्देशानुसार अनिवार्य रूप से शिक्षा सत्र 2003–2004 (परीक्षा 2004) से प्रभावशील किया गया है। स्वशासी महाविद्यालयों द्वारा भी अनिवार्य रूप से अंगीकृत किया जाएगा।
   **भाग 1, 2 एवं 3 में किसी भी वर्ष में पर्यावरण प्रश्न–पत्र उत्तीर्ण करना, अनिवार्य है। तभी उपाधि प्रदाय योग्य होगी।*
2. पाठ्यक्रम 100 अंकों का होगा, जिसमें से 75 अंकर सैद्धांतिक प्रश्नों पर होंगे एवं 25 अंक क्षेत्रीय कार्य (Field Work) पर होंगे।
3. सैद्धांतिक प्रश्नों पर अंक–75 (सभी प्रश्न इकाई आधार पर रहेगे जिसमें आंतरिक विकल्प रहेगा)
   (अ) लघु प्रश्नोत्तर –25 अंक
   (ब) निबंधात्मक –50 अंक
4. Field Work – 25 अंकों का मूल्यांक आंतरिक मूल्यांकन पद्धति से कर विश्वविद्यालय को प्रेषित किया जावेगा। अभिलेखों की प्रयोगिक उत्तर पुस्तिकाओं के समान संबंधित महाविद्यालयों द्वारा सुरक्षित रखेंगे।
5. उपरोक्त पाठ्यक्रम से संबंधित परीक्षा का आयोजन वार्षिक परीक्षा के साथ किया जाएगा।
6. पर्यावरण विज्ञान विषय अनिवार्य विषय है, जिसमें अनुत्तीर्ण होने पर स्नातक स्तर भाग–एक के छात्र/छात्राओं को एक अन्य विषय के साथ पूरक की पात्रता होगी। पर्यावरण विज्ञान के सैद्धांतिक एवं फील्ड वर्क में संयुक्त रूप से 33% (तैंतीस प्रतिशत) अंक उत्तीर्ण होने के लिए अनिवार्य होंगे।
7. स्नातक स्तर भाग–एक के समस्त नियमित/भूतपूर्व/अमहाविद्यालयीन छात्र/छात्राओं को अपना फील्ड वर्क सैद्धांतिक परीक्षा की समाप्ति के पश्चात् 10 (दस) दिनों के भीतर संबंधित महाविद्यालय/परीक्षा केन्द्र में जमा करेंगे एवं महाविद्यालय के प्राचार्य/केन्द्र अधिक्षकों/परीक्षकों की नियुक्ति के लिए अधिकृत रहेंगे तथा फील्ड वर्क जमा होने के सात दिनों के भीतर प्राप्त अंक विश्वविद्यालय को भेजेंगे।

**SULLABUS FOR**
**ENVIRONMENTAR STUDIES**

**M.M. 100**

**UNIT-I** THE MULTI DISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, Scope and Importance

**Natural Resources:**

**Renewable and Nonrenewable Resources :**

Natural resources and associated problems.

(a) Forest resources: Use and over-exploitation, deforestation, Case Studies, Timber extraction, mining, dams and their effects on forests and tribal people.

(b) Water resources: Use and over-utilization of surface and ground water, floods drought, conflicts over water, dams benefits and problems.

(c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. Case studies.

(d) food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging , Case studies.

(e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.

(f) Land resources: Land as a resource, land degradation, man induced landslides soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equaitable use of resources for sustainable life-styles.

**UNIT-II** **ECOSYSTEM**

**Concept, of an ecosystems.**

**Structure and Function of and ecosystem**

- Producers, consumers and decomposers.
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids.
- Introduction, Types, Characteristics Features, Structure and Function of The following ecosystem:

a. Forest, Ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatec ecosystems (Ponds, streams, lakes, rivers, oceans, estuaries)

**UNIT – III** **Biodiversity and its Conservation**

- Introduction – Definition : genetic, species and ecosystem diversity.
- Biogeofraphical classification of India.
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.
- Biodiversity at glibal, national and local levels.
- India as mefa diversity nation."
- Hot spots of biodiversity
- Threats to biodiversity : habitat loss, poaching of wildlife, manwildife conflicts.
- Endangered and endemic species of india.
- Conservation of biodiversity : In sity and Ex-situ conservation if biodiversity

**UNIT-IV Environmental Pollution**

**Definition**

- Causes, effects and control measures of
  a. Air pollution
  b. Water pollution
  c. soil pollution
  d. Marine pollution
  e. Noise polluation
  g. Naclear hazards.
- Solid waste managemen : Causes, effects and control measures of urban and industrial
- Wastes.
- Role of an individual in prevention of pollution.
- pollution case studies
- Disaster management : floods, earthquake, cycline and landslides.

**Human Population and the Environment**

- population growth, variation among nation,
- population explosion - Family Welfare programime.
- Environment and human health.
- Human Rights.

**UNIT - V Social Issues and the Environment**

- From Umsustainable to Sustainable development.
- urban problems related to energy.
- Water conservationb. rain water harvesting watershed management.
- Resettlement and rehabilitation of people, its problems and concersm. Case studies.
- Environmental ethies : Issues and possible solutions.
- Climate change, global warming, acid rain, ozone Layer dipletion nuclear accidents and holocaust Case studies.
- Wasteland reclamation.
- Consumerism and Waste products. Environment Protection Act
- Air (Pervention and Control of pollution) Act.
- Water (Pervention and Control of pollution) Act.
- Wildlife protection Act.
- Forest Conservation Act.
- Issues involved in enforcement of Environment lefislation.
- public awareness.
- Value Education
- HIV/AIDS
- Women and Child Welfare.
- Role of Information Technology in Environment and Human Health.
- Case Studies.

**FIELD WORK**

- visit to a local area to document environmental assets-river/fores/grassland/hill/mountain.
- visit to locla polluted site : urban/Rural/Industrial/Agriculture.
  Study of common plants, insects, birds.
- Study of simple ecosystms-pond, river, hill slopes. ets. (Field work Equal to 5 lecture Hours)

**REFERENCES:**


1. Agarwal k.c. 2001 Environmental Biology. Nidi Pubi. Ltd. Bikaner.
2. Bharucha Erach the Biodiversity of India Mapin pubishing Pvt Ltd. Ahmedabad 380013. India Email : Mapin@icenet.net
3. Bruinner R.C. 1989 Hazardous Waste Incineration Mc Graw Hill Inc. 480p.
4. Clark R.S. Marine Pollution, Clanderson Press Oxford (TB).
5. Cuningham, W.P, Cooper T.H. Gorhani, E& Hepworth. M.T.200.
6. Dr A.K. Environmental Chemisry, Wiley Estern Ltd.
7. Down to Earth Centre for Science and Environment
8. Gloick, H.P. 1993 Water in crisis, Pacifec Institute for Studies in Deve Environment & Security Stockholm Eng. Institute. Oxford Univ. Press. 437p.
9. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural. History Society, Mumbai ®.
10. Heywood, V.H. & Wastson, R.T. 1965 Global Biodiversity Assessment, Cabridge Univ. Press. 1140p.
11. Jadhav H. & Bhosale, V.H. 1965 Environmental Protection and Laws. Himalaya Pub. House. Delhi 284p.
12. Mckinney M.L. & School R.M. 1996. Environmental Science Systems & Solutions, Web enhanced editio. 639p.
13. Mhqaskar A.K. Matter Hazardous, Techno-Science Publication (T.B.).
14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (T.B.).
15 Odurn E.P. 1971 Fundamentals of Ecology, W.B. Saunders Co. USA, 574p.
16 Rao M.N. & Datta A.K. 1987, Waste Water Treatment. Oxford & IBH Publ.
co. Pvt. Ltd. 345p.
17. Sharma B.K. 2001 Environmental Chemistry, Goel Publ. House, Meerut.
19. Townsend C. Harper J. and Michael Begon Essentials of Ecology, Blackwll science (T.B).
20. Trivedi R.K. Handbook of Environment Environmental Laws. Rules, Guidelines, Compliances and Standards, Vol. I and II Environmenta Media (R.).
21 Trivedi R.K. and P.K. Goel, Introduction to air pollution, Tchno Science Publlication (T.B.).
22. Wagner K.D., 1998, Environmental Management. W.B. Saunders Co. Philadelphia,USA499p.]


(M) Magazine (R) Reference
(TB) Textbook.

# B.A./B.Sc. Part-III
## ANTHROPOLOGY
## PAPER-I
## "FUNDAMENTALS OF HUMAN GENETICS, HUMAN GROWTH AND NUTRITION"

**Total Marks: 50** **Pass Marks: 17**

Syllabus

**UNIT-I** Human Genetics: History, aims, scope and its application to human society

Cell Division: Mitosis and Meiosis; Mendelism

Chromosomes: Normal and Abnormal chromosomes.

Concept of Genes, DNA & RNA.

Types of Inheritance: Autosomal (Dominant and Recessive) & Sex linked Inheritance.

**UNIT-II** Human Growth: Definition and scope of Human growth, Methods of studying human growth and development, Ageing

**UNIT-III** Types of twins and their importance in genetic investigation.

Inheritance of ABO Blood groups, P.T.C., Colour blindness and dermatoglyphics. Genetic councelling, Eugenics.

Population Genetics: Hardy- Weinberg Law

**UNIT-IV** Nutrition: Nutritional requirement for normal growth. Common Nutritional disorders (Protein, Fat, Carbohydrate, Minerals, and Vitamins).

**UNIT-V** Ecology: Definition and Scope, Varieties of human ecosystems

Environmental Pollution

Biological Demography: Definition, nature and scope

Demographic Profiles: Fertility, Mortality, Morbidity.

# B.A./B.Sc. Part-III
## ANTHROPOLOGY
## PAPER-II
## THEORIES IN SOCIAL-CULTURAL ANTHROPOLOGY

**Total Marks 50** **Pass Marks: 17**

**UNIT-I** The contributions made by the following Anthropologists to Social-Cultural Anthropology.
(I) E. Durkheim, (II) F. Boas. (Ill) R. Redfield, (IV) A. L. Kroeber. (V) S.C. Dube, (VI) M.N. Shrinivas, (VII) L.P. Vidyarthi,

**UNIT-II** Evolution: Biological and cultural evolution
Evolutionism: Classical Evolutionism (E.B. Tylor & L.H. Morgan); Neo – Evolutionism (Leslie White & Gordon Childe)
Diffusions: British, German-Austrian (Culture cerise) and American diffusions (Cultural traits, Culture Complex, Culture Area, Culture focus)

**UNIT-III** Function and structure:
Functionalism (Malinowski)
Structure Functionalism (Radcliff Brown)
Structuralism (Levi - Strauss).

**UNIT-IV** Personality and Culture:
Basic personality and Model Personality (Cora-du-bois, Abraham Cardinal)
Culture pattern: Configurationalism (Ruth Benedict)
Anthropological study of National character
Contribution of Margret Mead in study of National Character

**UNIT-V** Field work tradition in Anthropology
Major tools of Research: Schedule, Questionnaire, observation, interview, case study, Genealogical Study
Types of Anthropological Methods: Historical Method, Comparative Method and Functional Method.

# B.A./B.Sc. Part-III
## ANTHROPOLOGY
## PAPER PRACTICAL
## SOMATOSCOPY, SOMATOMETRY AND GENETICAL TRAITS

**Total Marks: 50** **Pass Marks: 17**

**OBJECTIVES:**

The objective of this practical course is to introduce the student about the tools and Method, analysis & statistical methods used in Human Biology. Laboratory procedures in blood grouping and dermatoglyphics would give confidence in dealing with all the applied dimensions.

**UNIT-I** Somatoscopic Observation

1. Skin color
2. Eye
3. Nose
4. Hair
5. Lips

**UNIT-II** Somatometry:

(a) Measurements on body:

1. Height vertex,
2. Height tragus,
3. Suprasternale height,
4. Acromial Breadth,
5. Bi-illiocristal breadth,
6. Tibiae height,
7. Upper extremity length,
8. Sitting height,
9. Height dactyl ion,
10. Body weight.

(b) Head and Face Measurement:

1. Morphological upper facial length.
2. Physiognomic upper facial length.
3. Morphological facial length.
4. Bizygomatic breadth.
5. Max head length.
6. Max head breadth.
7. Nasal length.
8. Nasal breadth.

(c) Somatometry indices:

1. Cephalic index.
2. Nasal index.
3. Facial index.

**UNIT-III** Genetic Traits:

ABO blood group. Colour blindness, PTC taste sensitivity, Dermatoglyphics: Methods of taking finger and palm prints and their analysis

**UNIT-IV** Statistics: Mean, Median, Standard deviation, $X^2$ test.

## NEW CURRICULUM OF B.Sc. Part-III

## CHEMISTRY

The new curriculum will comprise of three papers of 33, 33 and 34 marks each and practical work of 50 marks. The Curriculum is to be completed in 180 working days as per UGC norms and conforming to the directives of Govt. of Chhattisgarh. The theory papers are of 60 hrs. each duration and practical work of 180 hrs duration.

## PAPER–I
## INORGANIC CHEMISTRY

**60 Hrs., Max Marks 33**

### UNIT-I METAL-LIGAND BONDING IN TRANSITION METAL COMPLEXES

(A) Limitations of valence bond theory, Limitation of Crystal Field Theory, Application of CFSE, tetragonal distortions from octahedral geometry, Jahn–Teller distortion, square planar geometry. Qualitative aspect of Legend field and MO Theory.

(B) Thermodynamic and kinetic aspects of metal complexes. A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, substitution reactions of square planar complexes, Trans- effect, theories of trans effect. Mechanism of substitution reactions of square planar complexes

### UNIT-II MAGNETIC PROPERTIES OF TRANSITION METAL COMPLEXES

Types of magnetic behavior, methods of determining magnetic susceptibility, spin only formula, L-S coupling, correlation of $\mu_{so(spin\ only)}$ and $\mu_{eff.}$ values, orbital contribution to magnetic moments, application of magnetic moment data for 3d metal complexes.

Electronic spectra of Transition Metal Complexes.

Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectro-chemical series. Orgel-energy level diagram for $d^1$ and $d^2$ states, discussion of the electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion.

### UNIT-III ORGANOMETALLIC CHEMISTRY

Definition and classification of organometallic compounds on the basis of bond type. Concept of hapticity of organic ligands. Metal carbonyls: 18-electron rule, electron count of mononuclear,

polynuclear and substituted metal carbonyls of 3d series. General methods of preparation (direct combination, reductive carbonylation, thermal and photochemical decomposition) of mono and binuclear carbonyls of 3d series.

Structures of mononuclear and binuclear carbonyls of Cr, Mn, Fe, Co and Ni using VBT. π- acceptor behavior of CO (MO diagram of CO to be discussed), Zeist's salt: Preparation and structure.

**Catalysis by Organometallic Compounds –**

Study of the following industrial processes and their mechanism :

1. Alkene hydrogenation (Wilkinsons Catalyst)
2. Polymeration of ethane using Ziegler – Natta Catalyst

UNIT-IV **BIOINORGANIC CHEMISTRY**

Essential and trace elements in biological processes, Excess and deficiency of some trace metals, Toxicity of some metal ions (Hg, Pb, Cd and As), metalloporphyrins with special reference to hemoglobin and myoglobin. Biological role of alkali and alkaline earth metals with special reference to $Ca^{2+}$ and $Mg^{2+}$, nitrogen fixation.

UNIT-V **HARD AND SOFT ACIDS AND BASES (HSAB)**

Classification of acids and bases as hard and soft. Pearson's HSAB concept, acid-base strength and hardness and softness. Symbiosis, Applications of HSAB principle.

**INORGANIC POLYMERS**

Types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of silicones. Silicates, phosphazenes and polyphosphate.

**REFERENCE BOOKS**


1. Basic Inorganic Chemistry, F. A. Cotton, G. Wilkinson and P. L. Gaus, Wiley.
2. Concise Inorganic Chemistry, J. D. Lee, ELBS.
3. Concepts of Models of Inorganic Chemistry, B. Douglas, D. Mc Daniel and J. Alexander, John Wiley.
4. Inorganic Chemistry, D. E. Shriver, P. W. Atkins and C. H. Langford, Oxford.
5. Inorganic Chemistry, W. W. Porterfield, Addison – Wiley.
6. Inorganic Chemistry, A. G. Sharp, ELBS.
7. Inorganic Chemistry, G. L. Miessler and D. A. Tarr, Prentice Hall.
8. Advanced Inorganic Chemistry, Satya Prakash.
9. Advanced Inorganic Chemistry, Agarwal and Agarwal.
10. Advanced Inorganic Chemistry, Puri, Sharma, S. Naginchand.
11. Inorganic Chemistry, Madan, S. Chand.
12. Aadhunik Akarbanic Rasayan, A. K. Shrivastav & P. C. Jain, Goel Pub.
13. Uchchattar Akarbanic Rasayan, satya Prakash & G. D. Tuli, Shyamal Prakashan.
14. Uchchattar Akarbanic Rasayan, Puri & Sharma.
15. Selected topic in Inorganic Chemistry by Madan Malik & Tuli, S. Chand.

## Paper – II
## ORGANIC CHEMISTRY

**60 Hrs. Max Marks 33**

**UNIT-I** **HETEROCYCLIC COMPOUNDS**

Classification and nomenclature, Structure, aromaticity in 5-membered and 6-membered rings containing one heteroatom; Synthesis, reactions and mechanism of substitution reactions of: Furan, Pyrrole (Paal-Knorr synthesis, Knorr pyrrole synthesis, Hantzsch synthesis), Thiophene, Pyridine (Hantzsch synthesis), Indole (Fischer indole synthesis and Madelung synthesis), Quinoline and isoquinoline, (Skraup synthesis, Friedlander's synthesis, Knorr quinoline synthesis, Doebner- Miller synthesis, Bischler-Napieralski reaction, Pictet- Spengler reaction, Pomeranz-Fritsch reaction).

**UNIT II** **A. ORGANOMETALLIC REAGENT**

Organomagnesium compounds: Grignard reagents formation, structure and chemical reactions.

Organozinc compounds: formation and chemical reactions. Organolithium compounds: formation and chemical reactions.

**B. ORGANIC SYNTHESIS VIA ENOLATES**

Active methylene group, alkylation of diethylmalonate and ethyl acetoacetate, Synthesis of ethyl acetoacetate: The Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate. Robbinson annulations reaction.

**UNIT-III** **BIOMOLECULES**

**A. CARBOHYDRATES** Occurrence, classification and their biological importance. Monosaccharides: relative and absolute configuration of glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth projections and conformational structures; Interconversions of aldoses and ketoses; Killiani Fischer synthesis and Ruff degradation; Disaccharides – Structural comparison of maltose, lactose and sucrose. Polysaccharides – Elementary treatment of starch and cellulose.

**B. AMINO ACIDS, PROTEINS AND NUCLEIC ACIDS** Classification and Nomenclature of amino acids, Configuration and acid base properties of amino acids, Isoelectric Point, Peptide bonds, Protein structure, denaturation/ renaturation, Constituents of nucleic acid, DNA, RNA nucleoside, nucleotides, double helical structure of DNA.

**UNIT-IV** **SYNTHETIC POLYMERS**

**A.** Addition or chain growth polymerization, Free radical vinyl polymerization, Ziegler-Natta polymerization, Condensation or Step growth polymerization, polyesters, polyamides, phenols- formaldehyde resins, urea-formaldehyde resins, epoxy resins and polyurethanes, natural and synthetic rubbers.

**B. SYNTHETIC DYES** Colour and constitution (Electronic Concept). Classification of Dyes. Chemistry of dyes. Chemistry and synthesis of Methyl Orange, Congo Red, Malachite Green, Crystal Violet, phenolphthalein, fluorescein, Alizarine and Indigo.

UNIT-V

**A. INFRA-RED SPECTROSCOPY**

Basic principle, IR absorption Band their position and intensity, IR spectra of organic compounds.

**B. UV-VISIBLE SPECTROSCOPY**

Beer Lambert's law, effect of Conjugation, Types of electronic transitions $\lambda_{max}$, Chromophores and Auxochromes, Bath chromic and Hypsochromic shifts, Intensity of absorption Visible spectrum and colour.

**C. NMR SPECTROSCOPY**

Basic principles of Proton Magnetic Resonance, Tetramethyl silane (TMS) as internal standard, chemical shift and factors influencing it; Spin – Spin coupling and coupling constant (J); Anisotropic effects in alkene, alkyne, aldehydes and aromatics, Interpretation of NMR spectra of simple organic compounds. $^{13}$CMR spectroscopy: Principle and applications.

**REFERENCE BOOKS**


1. Organic Chemistry, Morrison and Boyd, Prentice-Hall.
2. Organic Chemistry, L. G. Wade Jr. Prentice Hall.
3. Fundamentals of Organic Chemistry, Solomon's, John Wiley.
4. Organic Chemistry, Vol I, II, III S. M. Mukherjee, S. P. Singh and R. P. Kapoor, Wiley Easters (New Age).
5. Organic Chemistry, F. A. Carey, McGraw Hill.
6. Introduction to Organic Chemistry, Struiweisser, Heathcock and Kosover, Macmillan.
7. Acheson, R.M. Introduction to the Chemistry of Heterocyclic compounds, John Wiley & Sons (1976).
8. Graham Solomons, T.W. Organic Chemistry, John Wiley & Sons, Inc.
9. McMurry, J.E. Fundamentals of Organic Chemistry, 7th Ed. Cengage Learning IndiaEdition, 2013.
10. Kalsi, P. S. Textbook of Organic Chemistry 1st Ed., New Age International (P) Ltd. Pub.
11. Clayden, J.; Greeves, N.; Warren, S.; Wothers, P.; Organic Chemistry, Oxford University Press.

## Paper – III
## PHYSICAL CHEMISTRY

**60 Hrs. Max Marks 34**

**UNIT-I** **QUANTUM MECHANICS–I**

Black-body radiation, Planck's radiation law, photoelectric effect, Compton effect. Operator: Hamiltonian operator, angular momentum operator, Palladian operator, postulate of quantum mechanics, eigen values, eigen function, Schrodinger time independent wave equation, physical significance of $\psi$ & $\psi^2$, application of Schrodinger wave equation to particle in a one dimensional box, hydrogen atom (separation into three equations ) radial and angular wave functions.

**UNIT-II** **A. QUANTUM MECHANICS–II**

Quantum Mechanical approach of Molecular orbital theory, basic ideas-criteria for forming M.O. and A.O., LCAO approximation, formation of $H_2^+$ ion, calculation of energy levels from wave functions, bonding and ant bonding wave functions, Concept of $\sigma$, $\sigma^*$, $\pi$, $\pi^*$ orbital's and their characteristics, Hybrid orbitals-sp,$sp^2$,$sp^3$ Calculation of coefficients of A.O.'s used in these hybrid orbital's.

Introduction to valence bond model of $H_2$, comparison of M.O. and V.B. models. Huckel theory, application of Huckel theory to ethene, propene, etc.

**UNIT-III** **SPECTROSCOPY**

**Introduction**: Characterization of Electromagnetic radiation, regions of the spectrum, representation of spectra, width and intensity of spectral transition, Rotational Spectrum of Diatomic molecules. Energy levels of a rigid rotor, selection rules, determination of bond length, qualitative description of non-rigid rotator, isotopic effect.

**Vibration Spectroscopy:** Fundamental vibration and their symmetry vibrating diatomic molecules, Energy levels of simple harmonic oscillator, selection rules, pure vibration spectrum, determination of force constant, enharmonic oscillator

**Raman spectrum:** Concept of polarizability, quantum theory of Raman spectra, stokes and antismoke lines, pure rotational and pure vibration Raman spectra. Applications of Raman Spectra.

**Electronic Spectroscopy:** Basic principles, Electronic Spectra of diatomic molecule, Franck-Condon principle, types of electronic transition, application of electronic spectra.

**UNIT-IV** **ELECTROCHEMISTRY-I**

**A.** Electrolytic conductance: Specific and equivalent conductance, measurement of equivalent conductance, effect of dilution on conductance, Kohlrausch law, application of Kohlrausch law in determination of dissociation constant of weak electrolyte, solubility of sparingly soluble electrolyte, absolute velocity of ions, ionic product of water, conductometric titrations.

**B.** Theories of strong electrolyte: limitations of Ostwald's dilution law, weak and strong electrolytes, Elementary ideas of Debye-Huckel-Onsager's equation for strong electrolytes , relaxation and electrophoretic effects.

**C.** Migration of ions: Transport number, Determination by Hittorf method and moving boundary method, ionic strength.

UNIT-V **ELECTROCHEMISTRY-II**

**A.** Electrochemical cell and Galvanic cells – reversible and irreversible cells, conventional representation of electrochemical cells, EMF of the cell and effect of temperature on EMF of the cell, Nernst equation Calculation of $\Delta G$, $\Delta H$ and $\Delta S$ for cell reactions.

**B.** Single electrode potential: standard hydrogen electrode, calomel electrode, quinhydrone electrode, redox electrodes, electrochemical series

**C.** Concentration cell with and without transport, liquid - junction potential, application of concentration cells in determining of valiancy of ions , solubility product and activity coefficient

**D.** Corrosion-types, theories and prevention

**REFERENCE BOOKS**


1. Physical chemistry, G.M. Barrow. International Student Edition McGraw Hill.
2. University General Chemistry, CNR Rao, Macmillan.
3. Physical Chemistry R.A. Albert, Wiley Eastern.
4. The elements of Physical Chemistry P.W. Alkin, Oxford.
5. Physical Chemistry through problems, S.K. Dogra, Wiley Eastern.
6. Physical Chemistry B.D. Khosla.
7. Physical Chemistry, Puri & Sharma.
8. Bhoutic Rasayan, Puri & Sharma.
9. Bhoutic Rasayan, P.L. Soni.
10. Bhoutic Rasayan, Bahl & Tuli.
11. Physical Chemistry, R.L. Kapoor, Vol- I-IV.
12. Introduction to quantum chemistry, A.K. Chandra, Tata McGraw Hill.
13. Quantum Chemistry, Ira N. Levine, Prentice Hall.

**B.Sc. Part- III**
**PRACTICAL**

**Max. Marks-50**

## INORGANIC CHEMISTRY

Gravimetric analysis:

- Estimation of nickel (II) using Dimethylglyoxime (DMG).
- Estimation of copper as CuSCN
- Estimation of iron as $Fe_2O_3$ by precipitating iron as $Fe(OH)_3$.
- Estimation of Al (III) by precipitating with oxen and weighing as Al $(oxen)_3$ (aluminum oxinate).
- Estimation of Barium as $BaSO_4$

Inorganic Preparations:

- Tetraanminecopper (II) sulphate, $[Cu(NH_3)_4]SO_4.H_2O$
- Cis and trans K $[Cr(C_2O_4)_2.(H_2O)_2]$ Potassium dioxalatodiaquachromate(III)
- Tetraamminecarbonatocobalt (III) ion
- Potassium tris(oxalate)ferrate(III)/ Sodium tris(oxalate)ferrate(III)
- Cu(I) thiourea complex, Bis (2,4-pentanedionate) zinc hydrate; Double salts (Chrome alum/ Mohr's salt)

## ORGANIC CHEMISTRY

1. Preparation of organic Compounds
   - Acetylating of one of the following compounds: amines (aniline, o-, m-, p- toluidines and o-,m-, p-anisidine) and phenols (β-naphthol, vanillin, salicylic acid)
   - Benzolyation of one of the following amines (aniline, o-, m-, p- toluidines and o-, m-, panisidine) and one of the following phenols (β-naphthol, resorcinol, p cresol) by Shorten-Baumann reaction.
   - Bromination of any one of the following: a. Acetanilide by conventional methods b.Acetanilide using green approach (Bromated-bromide method)
   - Nitration of any one of the following: a. Acetanilide/nitrobenzene by conventional method b. Salicylic acid by green approach (using ceric ammonium nitrate).
   - Reduction of p-nitrobenzaldehyde by sodium borohydride.
   - Hydrolysis of amides and esters.
   - Semicarbazone of any one of the following compounds: acetone, ethyl methyl ketone, cyclohexanone, benzaldehyde.
   - Benzylisothiouronium salt of one each of water soluble and water insoluble acids (benzoic acid, oxalic acid, phenyl acetic acid and phthalic acid).
   - Aldol condensation using either conventional or green method.
   - Benzil-Benzilic acid rearrangement.
   - Preparation of sodium polyacrylate.
   - Preparation of urea formaldehyde.
   - Preparation of methyl orange.

The above derivatives should be prepared using 0.5-1g of the organic compound. The solid samples must be collected and may be used for recrystallization, melting point and TLC.

2. Qualitative Analysis Analysis of an organic mixture containing two solid components Using water, $NaHCO_3$, NaOH for separation and preparation of suitable derivatives.
3. Extraction of caffeine from tea leaves.
4. Analysis of Carbohydrate: aldoses and ketoses, reducing and non-reducing sugars.

5. Identification of simple organic compounds by IR spectroscopy and NMR spectroscopy. (Spectra to be provided).
6. Estimation of glycogen by Sorenson's formalin method.
7. Study of the titration curve of glycogen.
8. Estimation of proteins by Lowry's method.
9. Study of the action of salivary amylase on starch at optimum conditions.
10. Effect of temperature on the action of salivary amylase.

**PHYSICAL CHEMISTRY**

Conductometry

- Determination of cell constant
- Determination of equivalent conductance, degree of dissociation and dissociation constant of a weak acid.
- Perform the following conduct metric titrations:
  i. Strong acid vs. strong base
  ii. Weak acid vs. strong base
  iii. Mixture of strong acid and weak acid vs. strong base
  iv. Strong acid vs. weak base
- To determine the strength of the given acid conduct metrically using standard alkali solution.
- To determine the solubility and solubility product of a sparingly soluble electrolyte conduct metrically
- To study the saponification of ethyl acetate conduct metrically Potentiometer/pH metry Perform the following potent/pH metric titrations:
  i. Strong acid vs. strong base
  ii. Weak acid vs. strong base
  iii. Dibasic acid vs. strong base
  iv. Potassium dichromate vs. Mohr's salt
  v. Determination of pka of monobasic acid

UV/ Visible spectroscopy

- Verify Lambert-Beer's law and determine the concentration of $CuSO_4/KMnO_4/K_2Cr_2O_7$ in a solution of unknown concentration
- Determine the concentrations of $KMnO_4$ and $K_2Cr_2O_7$ in a mixture.
- Study the kinetics of iodination of prop none in acidic medium.
- Determine the amount of iron present in a sample using 1,10-phenathroline.
- Determine the dissociation constant of an indicator (phenolphthalein).
- Study the kinetics of interaction of crystal violet/ phenolphthalein with sodium hydroxide.
- Study of pH-dependence of the UV-Vis spectrum (200-500 nm) of potassium dichromate.
- Spectral characteristics study (UV) of given compounds (acetone, acetaldehyde, acetic acid, etc.) in water.
- Absorption spectra of $KMnO_4$ and $K_2Cr_2O_7$ (in 0.1 M $H_2SO_4$) and determine $\lambda_{max}$ values.

**Note: Experiments may be added/deleted subject to availability of time and facilities**

**REFERENCE BOOKS:**

1. Vogel, A.I. Quantitative Organic Analysis, Part 3, Pearson (2012).31
2. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)

3. Furness, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)
4. Ahluwalia, V.K. & Agarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000).
5. Ahluwalia, V.K. & Dhingra, S. Comprehensive Practical Organic Chemistry: Qualitative Analysis, University Press (2000)
6. Manual of Biochemistry Workshop, 2012, Department of Chemistry, University of Delhi.

**8 Hrs.** **PRACTICAL EXAMINATION** **M.M.50**

Five experiments are to be performed.

1. **Inorganic** - Two experiments to be performed. Gravimetric estimation compulsory **08 marks**. (Manipulation 3 marks)

   Anyone experiment from synthesis and analysis **04 marks**.
2. **Organic** - Two experiments to be performed. Qualitative analysis of organic mixture containing two solid components. compulsory carrying **08 marks** (03 marks for each compound and two marks for separation).

   One experiment from synthesis of organic compound (Single step) **04 marks**.

3. Physical-One physical experiment **12 marks**.
4. Sessional **04 marks**.
5. Viva Voce **10 marks**.

In case of Ex-Students, one mark each will be added to Gravimetric analysis and Qualitative analysis of organic mixture and two marks in Physical experiment.

**B.Sc Part-III**
**GEOLOGY**
**PAPER –I**
**(PALEONTOLOGY & STRATIGRAPHY)**

**UNIT-1**

(1) Paleontology: Fossils- definition, Essentials for fossilization mode of Fossilization.
(2) Uses of fossils; Index fossils & their significance.
(3) Application of paleontology in the study of Stratigraphy. Palaeoecology And Palaeo-geography.
(4) Micro paleontology & their significance.
(5) Study of plant fossils & their significance.

**UNIT-2**

(1) Morphology & Geologic distribution of foraminifera & Entozoan fossils.
(2) Morphology & Geological distribution of Gastropod and lamellibranchiatem fossils.
(3) Morphology & Geological distribution or Cephalopoda.
(4) Morphology & Geological distribution or Echinoidae & Brachiopoda fossils.
(5) Morphology & Geological distribution of Trilobite and Graptolite fossils.

**UNIT-3**

(1) Principles of Stratigraphy: Geological time scale.
(2) Basic concept of lithostratigraphic, chronostratigraphic & Biostratigraphic Units.
(3) Structural & Physical Subdivision of Indian subcontinents.
(4) Distribution, classification & Economic importance or Archaeozoic rocks of India (Dharwar)
(5) Distribution, Stratigraphy & Economic Importance of Bastar & Raoghat group of rocks (Chhattisgarh)

**UNIT-4**

(1) Distribution, Stratigraphy & Economic importance of Vindhya & Chhattisgarh group of rocks.
(2) Stratigraphy, Palaeoclimate, Geographical distribution & economic aspects of Gondwana rocks.
(3) Stratigraphy, distribution & age of Deccan Traps.
(4) Stratigraphy, distribution & fossil contents of Bagh & Lameta Bed.
(5) Distribution, Stratigraphy & Paleontology of salt Range group of rocks.

**UNIT-5**

(1) Distribution, Stratigraphy & Economics of Paleozoic rocks of Spite Valley.
(2) Stratigraphy, Distribution, Fossil content of Cretaceous rocks of Trichinapalli.
(3) Stratigraphy, distribution, Fossil content & Economics of Jurassic rocks of Kutch Region.
(4) Distribution, Stratigraphy, economic importance of Tertiary rocks of Assam-Region.
(5) Distribution, Stratigraphy & Paleontological importance of Siwalik group of Rocks.

**PRACTICAL:-**

(1) Study of Morphology of Fossils belonging to various phyla.
(2) Study of Important plant fossils.
(3) Representation of Litho-units & Stratigraphy Units in out line map of India.
(4) Sketching of physiographic and tectonic divisions of India.
(5) Geological excursion for seven days.

**B.Sc Part-III**
**GEOLOGY**
**PAPER –II**
**(EARTH RESOURCES & APPLIED GEOLOGY)**

**UNIT-I**

(i) Economic Geology & its perspectives; Global mineral deposit & resource. Distribution of mineral deposits in time & space.

(ii) Classification of mineral deposits. Geological thermometers.

(iii) Magmatic & Hydrothermal processes of mineral formation.

(iv) Weathering : product & Residual deposit. Oxidation & sulphide supergene Enrichment processes.

(ii) Sedimentary processes of mineral formation. Placer deposits.

**UNIT-II**

Geological, Geographical distribution, mode of occurrence, mineralogy & economic Importance of following metallic & nonmetallic deposits of India.

(i) Iron, Manganes, Chromium

(ii) Copper, Lead, Zinc

(iii) Gold, Aluminium

(iv) Refractory and Fertilizer minerals

(v) Minerals used in cement & chemical industries.

**UNIT-III**

(i) Coal deposit: Origin, Definition & stratigraphy

(ii) Fundamentals of coal petrography. Peat, Lignite, Bituminous & Anthracite Coal deposits of Chhattisgarh.

(iii) Origin of Natural-hydrocarbon, migration & accumulation. Types of oil traps; Structural, Stratigraphy and composite. Offshore & onshore oil deposits of India.

(iv) Radioactive mineral: Mineralogy, Geochemistry, Prospecting techniques, Geological & Geographical distribution of atomic-mineral.

(vi) Principles of mineral economics. National mineral policy.

**UNIT-IV**

(i) Engineering geology & its importance, Engineering properties of rocks

(ii) Geological conditions for establishing of large Dam and Tunnels.

(iii) Elementary study of Aerial photographs & satellite Imageries. Application of remote sensing in town-planning.

(iv) Hydrologic cycle. Mode of occurrence of ground water, Quality of ground water.

(v) Hydrologic properties of rocks. Classification of Aquifers. Ground water Provinces of India.

**UNIT-V**

(i) Introduction to mineral exploration, Surface & subsurface methods of Mineral Exploration.

(ii) Prospection methods; Drilling, Sampling & Assaying.

(iii) Geophysical prospecting techniques: Gravity, Electrical & Magnetic methods.

(iv) Aerial and seismic prospecting methods.

(v) Environmental impacts of over exploitation of mineral resources.

**PRACTICAL-**

(1) Study of important metallic/nonmetallic minerals on the basis of physical & optical properties.

(2) Distribution of main metallic/nonmetallic deposits within outline map of India.

(3) Magascopic studies of coal & its varieties.

(4) Exercises related with mineral exploration; Reserve calculation, Tonnage factor calculation, Exercises related with drilling.

(5) Study of Aerial photographs with the help of stereoscopes.

(6) Study of satellite imageries.

(7) Study of hydrologic properties of rocks, Preparation of hydrological maps.

(8) Geological excursion for ten days.

**B.Sc. Part-III**
**BIOTECHNOLOGY**
**PAPER – I**
**PLANT, ENVIRONMENTAL AND**
**INDUSTRIAL BIOTECHNOLOGY**

**MM-50**

UNIT-I

1. Introduction to Plant cell and Tissue culture: History, Scope and Application.
2. Tissue culture Media and Cellular Differentiation.
3. Protoplast Isolation and Fusion, Organogenesis, Embryogenesis, Anther and Ovary culture.

UNIT-II

1. Agrobacterium Mediated Transformation, Ti and Ri Plasmid.
2. Bt Gene and Bt Cotton, Edible vaccines and Genetically modified plants- Golden Rice, Herbicide Resistance, Drought Resistance.
3. Germplasm storage and Cryopreservation.

UNIT-III

1. General Introduction and Scope of Environmental Biotechnology.
2. Environmental Pollution and its type.
3. Solid Waste Management: Principle of management, Types of Sources, Effect of Solid waste, Concept of composting and Vermi composting.
4. Wastewater Treatment: Physical, Chemical, and Biological.

UNIT-IV

1. Biofertilizer and Biopesticides- Cyanobacteria, Bacteria, Fungi; Significance and Practices.
2. Bioremediation of Xenobiotics compounds.
3. Types of IPR-Patents, Copyright, Trademark, G.I., Patenting Genes and Life form.

UNIT-V

1. Types of Bioreactor: Design of Stirred tank, Fluidized bed.
2. Fermentation: Lactic acid and Alcohol.
3. Industrially important Microorganisms: Isolation, Preservation (Slant, Mineral Oil and Lyophilize) and its application.
4. Food Technology: Food spoilage. Canning, Packing and Food Preservation.

# B.Sc. Part-III
## BIOTECHNOLOGY
## PAPER–II
## IMMUNOLOGY, ANIMAL AND MEDICAL BIOTECHNOLOGY

**MM-50**

### UNIT-I

1. Concept of Immunity: Innate and Acquired, Humoral and Cell mediated Response.
2. Cells and Organs involved in Immune system-Structure and Function.
3. Antigen, Antibody: Types, Structure and Functions.

### UNIT-II

1. Cytokines
2. Autoimmune diseases- Hemolytic Anemia, Rheumatoid arthritis, Insulin dependent diabetes.
3. Immuno deficiencies. Diseases-SCID, AIDS.

### UNIT- III

1. Antigen-Antibody Interaction: Agglutination, Precipitation, RIA, ELISA, Immuno Electrophoresis and Immunofluorescence.
2. Immunity of Infectious Diseases: Protozoa (Malaria, Kalaazar), Bacteria (T.B., Typhoid) and Virus (Influenza, Pox).
3. Fundamental of Epidemic Diseases: Swine flu and Dengue.

### UNIT-IV

1. Animal Cell Culture and Growth Media.
2. Primary, Secondary culture and Established Cell line Culture.
3. Tissue engineering: Basic Concept, Transgenic animal: Mice and Sheep.

### UNIT-V

1. Hypersensitivity, Interferon and Monoclonal antibody.
2. Organ Transplantation, Biology of Cancer.
3. In vitro fertilization and Embryo Transfer.

**List of Books-**


1. A test Book of Biotechnology: Indu Shekher Thakur, 2nd edition. I.K. International Pvt. Ltd., New Delhi.
2. Biotechnology (Fundamentals and Applications): S.S. Purohit - Agrobios (India), Jodhpur.
3. Fundamentals of Microbiology and Immunology: Ajit Kr. Banerjee, Nirmalya Banerjee -New central Book Agency (P) Ltd., Kolkata.
4. Plant Biotechnology: H.S. Chawla - Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
5. Plant Biotechnology: B.D. Singh - Kalyani Publication, New Delhi.
6. Biotechnology: Fundamental &Application (2005) S.S. Purohit
7. Immunology: J. Kubey et al. 7th edition.
8. Immunology: Roitt et al.
9. Fundamental of Immunology: W. Paul.
10. Plant Tissue culture: K.K.De.
11. Plant Tissue Culture (Practical): H.S. Chawla.
12. Biochemistry & Molecular Biology of Plant: Buchanan, Gruissemen& Jones 2nd edition.
13. Tools and Techniques in Biotechnology (2011) M. Debnath

## List of Practical's
## PLANT, ENVIRONMENTAL, INDUSTRIAL AND MEDICAL BIOTECHNOLOGY

1. Preparation of Tissue culture media.
2. Sterilization of plant material.
3. Seed Germination, Root, Shoot and Callus Culture.
4. Determination of total dissolved solids of water.
5. Determination of DO, BOD, COD of water.
6. Determination of Coliform by MPN Test.
7. Production of Enzymes/Antibiotics/Acids.
8. Effect of Biopesticides on microorganism
9. Antigen Antibody interaction- Determination of Blood Group and Rh factor.
10. Widal Test
11. VDRL Test.
12. ELISA Test.
13. Perform of Immuno-diffusion

## SCHEME FOR PRACTICAL EXAMINATION

**Time: 4 hrs.** **MM-50**

| | |
|---|---|
| 1. Experiment based on Paper - I | 08 marks |
| (i) Plant tissue culture | 07marks |
| (ii) Environment / Industrial | |
| 2. Experiment based on Paper - II | 15 marks |
| 3. Spots | 10marks |
| 4. Viva-voce | 05marks |
| 5. Sessional/ Record | 05marks |

# B.Sc.Part-III
# BOTANY
# PAPER –I
# (ANALYTICAL TECHNOLOGY PLANT PATHOLOGY, EXPERIMENTAL EMBRYOLOGY, ELEMENTARY BIOSTATISTICS, ENVIRONMENTAL POLLUTION AND CONSERVATION)

**UNIT-I** Structure, Principle and applications of analytical instrumentation.

Chromatography technique, Oven, Incubator, Autoclave, Centrifuge, Spectrophotometer

**UNIT-II** Plant Tissue culture techniques, growth media, totipotency, protoplast culture, somatic hybrids and cybrids, micropropagation , somaclonal variations, haploid culture.

Analytical techniques: Microscopy-Light microscope, Electron microscope

**UNIT-III** General principles of plant pathology, general symptoms of fungal, bacterial and viral diseases, mode of infection, diseases resistance and control measures, plant quarantine. A study of epidemiology and etiology of following plant diseases.

Rust diseases of wheat, Tikka diseases of groung nut, Red rot of sugar can, Bacterial blight of rice, Yellow vein mosaic of b hindi, Little leaf of brinjal.

**UNIT-IV** Introduction to pollution, green house gases, Ozone depletion, Dissolve oxygen, B.O.D., C.O.D.

Bio magnification, Eutrophication, Acid precipitation, Phytoremediation, Plant indicators,. Biogeographical Zones of India, Concept of biodiversity, CBD, MAB, National parks and biodiversity Hot spots, Conservation strategies, Red Data Book, IUCN threat categories, invasive species, endemic species, concept of sustainable development.

**UNIT-V** **ELEMENTARY BIOSTATISTICS:**
Introduction and application of Biostatics, measure of central tendency-Mean, Median, Mode, measures of dispersal-Standard deviation, standard error.

**BOOKS RECOMMENDED:**


- Singh, RS, Plant Diseases, Oxford & IBH, New Delhi.
- Pandey, BP, Plant Pathology, S.Chand Publishing, New Delhi
- Sharma, PD, Microbiology and Plant pathology, Rastogi Publications, Meerut
- Sharma PD, Mycology and Phytopathology, Rastogi Publications, Meerut
- Singh JS, Singh SP and Gupta, SR, Ecology Environmental Science and Conservation, S. Chand Publishing, New Delhi
- Sharma, PD. Ecology and Environment, Rastogi Publiications, Meerut
- Bhojwani, SS and Razdan, MK, Plant Tissue Culture:Theory and Practices, Elsevier
- Sharma AK, Text book of Biostatistics, Discovery Publishing House Pvt. Ltd.

# B.Sc.Part-III
# BOTANY
## PAPER –II
## (GENETICS, MOLECULAR BIOLOGY, BIOTECHNOLOGY AND BIOCHEMISTRY)

**UNIT-I** Cell and cell organelles, organization and morphology of chromosomes, giant chromosomes, cell division, Mendel's laws, gene interactions, linkage and crossing over, chromosomal aberration, polyploidy, sex linked inheritance, sex determination, cytoplasmic inheritance, gene concept: cistron, muton, recon.

**UNIT-II** Nucleic acids, structure and forms of DNA and RNA, DNA/RNA as genetic material, replication of DNA, biochemical and molecular basis of mutation, genetic code and its properties, mechanism of transcription and translation in prokaryotes, regulation of gene expression, Operon model.

**UNIT-III** Recombinant DNA, Enzymes in recombinant DNA technology, cloning vectors (Plasmid, Bacteriophages, Cosmids, Phagemids), gene cloning, PCR, Application of Biotechnology; G.M.Plants, Monoclonal antibodies, DNA finger printing

**UNIT-IV** Protein: Chemical composition, primary, secondary and tertiary structure of Proteins.

Carbohydrate: general account of monosaccharides, disaccharids and Polysaccharides

Fat: Structure and properties of fats and fatty acids, synthesis and breakdown.

**UNIT-V** ENZYMES: Nomenclature and classifaction, components of enzyme, theories of enzyme action, enzyme kinetics (Michaelis-Menten constant), allosteric enzymes, isozymes, Abzymes. Ribozymes, factors affecting enzyme activity.

**BOOKS RECOMMENDED:**


- Nelson, DL, Cox, MM, Lehninger Principles of Biochemistry, W.H. freeman and Company, New York, USA.
- Cooper, GM, The Cell: A Molecular Approach, ASM Press & Sunderland, Washington, D.C. Sinauer Associates, MA.
- Singh BD, Fundamental of Genetics, Kalyani Publication
- Singh BD, Genetics, Kalyani Publication
- Gupta, PK, Cell and Molecular Biology, Rastogi Publications, Meerut
- Singh, BD, Biotechnology: Expanding Horizons, Kalyani publications
- Gupta, PK, Elements of Plant Biotechnology, Rastogi Publications, Meerut
- Gupta, SN, Concepts of Biochemistry, Rastogi Publications, Meeru
- Jain, JL., Jain S, Jain, N, Fundamentals of Biochemistry, S Chand Publishing, New Delhi

**B.Sc.Part-III**
**BOTANY**
**PRACTICAL**

1. Study of host parasite relationship pf plant diseases listed above.
2. Demonstration of preparation of Czapek's Dox medium and Potato dextrose agar medium, sterilization of culture medium and pouring.
3. Inoculation in culture tubes and petriplates.
4. Gram Staining.
5. Microscopic examination of Curd.
6. Study of plant diseases as listed in the theory paper.
7. Biochemical test of carbohydrate and protein.
8. Instrumentation techniques

## PRACTICAL SCHEME

**TIME: 4 Hrs.** **M.M.: 50**

| | | |
|---|---|---|
| 1. | Plant Disease/Symptoms | 10 |
| 2. | Instrumentation techniques | 05 |
| 3. | Staining of Microbes | 05 |
| 4. | Tissue Culture techniques | 05 |
| 5. | Spotting | 10 |
| 6. | Project Work/ Field Study | 05 |
| 7. | Viva-Voce | 05 |
| 8. | Sessional | 05 |

**B.Sc.Part-III**

**COMPUTER SCIENCE**

**PAPER-I**

**COMPUTER HARDWARE**

**AIM:** The emphasis in on the design & organizational of the common PC, Leaving the complicated Electronic of the system to the computer engineers.

**Objective of the Course:**

1. To introduce the overall organisation of microcomputers and operating system.
2. To introduce the interaction of common devices used with computers with operating software's, excluding the Assembly languages, with special reference to DOS/WINDOWS.
3. To introduce the working of hardware components, Micro-processor and various chips used in micro-computers by operating system, without the use of electronic circuitry.
4. To introduce the use of operating system architecture with IBM-PC & Clones, excluding Assembly language, with forms an important part of hardware's.

**N.B.:** Since the computer, organisation study is very vast & Complicated, so the study is restricted only to the description and understanding part, hence the paper-setter is requested to keep this important factor in mind.

**UNIT-I** **ORGANISATION OF Micro-Processor & MICRO-COMPUTER:-**

1. **Introduction & organisation of Micro-Computer:**
   a) Basic Components of Microcomputer: Basic Block, Prom ram memory: Data memory; I/O Ports; Clock generator; Integration of functional blocks.
   b) Interconnecting Components in a Micro-computer: Necessary functional block; Bussed architecture for microcomputer; memory addressing; Ad- dressing I/O ports; comparison of I/O mapped and memory mapped I/O.
   c) Input Output techniques: Non-CPU devices, Program & interrupt controlled I/O; Hardware controlled I/O or IMA.
2. **An Introduction to the various as:**
   a) General understanding of different up or CPU:
   Intel 8088, 286, 386, 486, 586 Pentium, PS4C, MMX P55C; Motorola 6800 & 88100 series; CYRIX & AMD CPUs
   b) The Registers of CPU: (Give Example of P-8088) Register organisation of 8088, Scratch pad segment pointer, Index and Flag, Registers.
   c) Memory addressing modes of P-8088: Segment offset; Data addressing modes; Addressing for branch instructions.
   d) I/O Addressing with P-8088: Memory mapped I/O & I/O mapped I/O.

**UNIT-II** **SYSTEM HARDARE ORGANISATION OF COMPUTERS:**

1. **Hardware Organisation of the Personal Computer:**
   a) Block diagram with various parts of PC.
   b) The Mother Board of General P.C: 8088 CPU; ROM & RAM; Keyboard & its interface; System timer/counters; Hardware interrupt vectoring; DMA controller & channels; Interfacing to audio speaker; Bus slots & facture cards.
   c) The Serial I/O ports, COM-1 & COM-2.
   d) The parallel Port for Printer.

e) Expansion Slots for RAM.
f) Disk Controllers: For floppy, Hard disk, CD-ROM & Cassets drives.

2. **The Video Display of PCs:**
   a) Video Monitors; Monochrome and color.
   b) Video Display Adapters & Their Video Modes; Monochrome & color graphics adapters.
   c) Video Control Through ANST-SYS
   d) Video Control Through ROM-BOIS: INT 10H.
   e) Direct Video Control; Monochrome & color graphics adapters.
   f) Installing Customized Character Sets.

**UNIT-III** **ORGANISATION OF OPERTING SYSTEM WITH SYSTEM HARDWARE:**

1. **The ROM-BIOS Services:**
   a) Introduction to UNIX, ENIX, SUN, Solaris, DOS & MAC with special reference to DOS & Windows, its ver., as DOS becomes more popular than others in PCs.
   b) The ROM-BIOS Diskette services, INT 13H.
   c) The ROM-BIOS Keyboard Services, INT 16H.
   d) The ROM-BIOS Printer Services, INT 17H.
   e) Miscellaneous Service Provided by the ROM-BIOS: INT 05H, INT 11H, INT 12H, INT 18H, INT 19H, INT 1AH.
2. **The fundamental of Operating System viz. Dos/WINDOWS:**
   a) The loading of DOS & Its Basic Structure; ROM bootstrap, IO.SYS, DOS.SYS & Command. COM.
   b) The Execution of the programs under DOS; EXEC functions, program segment prefix, Features of COM & EXE program files.
   c) Device Handling by Dos; FDD, HDD, CON, Keyboard, PRN, AUX, CLOCK and NUL devices; Block devices; Character devices; Driver installation sequence.
   d) File Structures of DOS;
   e) The DOS Interrupts: INT 20H-2Fh
   f) The DOS functions through INT 21H, Discuss only the understanding part of various other DOS function to handle hard & software's.
   g) Installation of windows: Important system files in windows.

**UNIT-IV** **ORGANIZATION & HANDLING BY OPERATING SYSTEMS:**

1. **Disk and Files under DOS:**
   a) Logical Structure of a Disk: Organisation of disk for use; BOOT record; FAT files; disk or root directory.
   b) File Organisation on a DOS disk: Logical volumes; Sub directories; Volume labels.
   c) Manipulating Files under DOS: File attributes; date and time, file Access; FCB functions.
2. **Memory Allocation, Program Loading and Execution:**
   a) Memory Management under DOS: Exec loader; Memory management & its functions; Modifying a Program's memory allocation.
   b) Loading and Executing Programs under DOS: The EXEC function; Memory considerations; parameter block; calling returning form EXEC.

UNIT-V **ORGANISATION OF HARDWARE BY OPERATING SYSTEM**

1. **Interrupt Handling through DOS:**
   a) Types of interrupts.
   b) Interrupt Vector Table in PC.
   c) Interrupt Service Routines.
   d) Special Interrupts in PC: Clock Interrupt; The C or Break Interrupt; DOS reserved interrupt INT 28H; Patching memory resident routines.
2. **Filters for DOS:**
   a) Filters in operating systems.
   b) Redirection of I/O under DOS.
   c) The Filters Supplied with DOS.
   d) Writing Filters to run under DOS.
3. **Handling of Various Versions of Windows O.S.**
   a) Setup Installation
   b) Trouble Shooting
   c) Networking features

**Text Book:**

1. Hardware and Software of Personal Computers.
   By Sanjay K. Bose. (Wiley Eastern Ltd. New Delhi).

**Supporting Text Books:**

1. Digital System from Gates to Microprocessor.
   By Sanjay K. Bose. (Wiley Eastern Ltd. New Delhi).

**Reference Books:**

1. IBM PC-XT and Clones: By Govinda Rajalu.
2. Microprocessor and interfacing : By Douglas Hall.
3. Insight the IBM-PC: Peter Norton.
4. Microprocessor System : 8086/8088 family architecture, programming & design : By Liu and Gibscn.

**B.Sc.Part-III**

**COMPUTER SCIENCE**

**PAPER-II**

Atm: To introduce DBMS and RDEMS using Back-end tool and Front-end tool.

**Object of the Course:**

1. To introduce Data BASE Management system concepts.
2. To introduce the Relational Database Management System and Relational Database Design.
3. To introduce the RDBMS software and utility of query language.
4. To introduce basic concept of GUI Programming and database connectivity using Visual Basic.

**UNIT-I** **CONCEPTS OF D.B.M.S. AND DATA MODELS**

a) Introduction to DBMS:- Purpose of Data base systems, views of data, Data Modeling Database Languages, Transaction management, Storage Management, Database Administrator and User, Database System Structure.

b) E-R Model: Basic concepts, Constraints, Keys, Mapping Constraint, E-R Diagram, Weak and Strong Entity seets, E-R Database Schema, Reduction of an E-R Schema to Table.

**UNIT-II** **RELATIONAL DATABASE MANAGEMENT SYSTEM**

a) Relational Model: Structure of Relational Database, Relational Algebra, Domain Relational Calculus, Extended Relational-Algebra Operation, Modification of database, Views.

b) Relational Database Design: Pitfalls in Relational Database Designs, Decampo-sition Functional Dependencies, Normalization: 1NF, 2NF, BCNF, 3NF, 4NF, 5NF.

**UNIT-III** **INTRODUCTION TO RDBMS SOFTWARE-ORACLE**

a) Introduction: Introduction to Personal and Enterprises Oracle, Data Types, Commercial Query Language, SQL, SQL*PLUS.

b) DDL and DML: Creating Table, Specifying Integrity Constraint, Modifying Existing Table, Dropping Table, Inserting Deleting and Updating Rows in as Table, Where Clause, Operators, order BY, GROUP Function, SQL Function, Join, Set Operation, SQL Sub Queries. Views: What is Views, Create, Drop and Retrieving data from views.

c) Security: Block Structure in PL/SQL, Variable and constants, Running PL/SQL in the SQL*PLUS, Data base Access with PL/SQL, Exception Handling, Record Data type in PL/SQL, Triggers in PL/SQL.

**UNIT-IV** **G.U.I. PROGRAMING**

a) Introduction to Visual Basic: Event Driven Programming IDE, Introduction to object, Controlling Objects, Models and Events, Working with Forms, MDI Form Working with standard Controls.

b) Overview of Variables, Declaring, Scope, Arrays, User defined data types, Constants, Working with Procedures: Function, Subroutine, and Property. Working with Data, Time, Format, String, and Math's Function. Controlling Program Execution: Comparison and Logical Operators, If...Then statements, Select Case Statement, Looping Structures, Exiting a loop Error Trapping and Debugging.

c) File Organization: Saving data to file, Sequential and Random access file, the desing and coding.

UNIT-V **V DATA BASE PROGRAMMING IN VB**

a) Introduction: Concept of DAO, PDO, ADO, input validation: field & form level validation, ADO Object model: the ADO object Hierarchy, the connection object, the command object, record set object, parameter object, field object, record object, stream object, Error object, parameter object.

b) Using Bound Control to Present ADO data: Using the ADO data control, ADO data Control properties, binding simple controls: Data list, data combo, Data Grid, Data Form Wizard: single form Wizard, Grid form, master/Detail form Programming the ADO data control: Refresh method, Event, Hierarchical flex Grid control.

c) Data Environment & DATA Report: Creating connection, Using command object in the data Environment, Data Environment option and operation, Binding Form to the data Environment, ADO Events in the Data report, Print Preview, Print, Export, Data report in Code: Data reports Events, Binding data reports directly.

**REFERENCE BOOKS:**


1. Data Base System Concept : By Hery F. Korth, Tata McGraw Hill
2. Fundamental of Data Base System Concept : Nawathe & Elmasri (Pearson educations)
3. Oracle Complete Reference : By Oracle Press
4. Introduction to OOPS & VB : By V.K. Jain, Vikas Publishing House
5. Database Programming VB 6 : By B.P.B. Publication


**PRACTICALS:**

1. **Practical's on Oracle:**
   At Least 20 Practical's covering the SQL, PL/SQL, Triggers, Views.
2. **Practical's on Visual Basic:**
   At least 20 practical's on VB that covering basic and data controls components.

**B.Sc.Part-III**
**INFORMATION TECHNOLOGY**
**PAPER-I**
**AMPLIFIERS AND OSCILIATORS**

UNIT-I **POWER AMPLIFIER:** Classification of power amplifiers, requirement of power amplifiers, single ended class A power amplifier, and its efficiency, transformer coupled power amplifier, power dissipation curve, harmonic dissipation curve, harmonic distortion in push pull power amplifier, power and efficiency calculation for push pull for push pull power amplifier, Distortion in push pull power amplifier, Advantages of push pull power amplifier.

UNIT-II **FEEDBACK AMPLIFIERS AND OSCILIATORS:** Feedback in amplifiers, types of feedback positive, and negative feedback. Derivation of input and output impedance in voltage and current series feedback. Advantage of negative feedback. Positive feedback. Berkhauson criteria for sustained oscillator. RF oscillators-Hartley oscillator, colpetts oscillators (Qualtitative study) relaxation oscillators, Multivibraton- As table, Monostable.

UNIT-III **OPERATIONAL AMPLIFIER AND POWER CONTROL DEVICES:** Differential amplifier, operational amplifier, Characteristics of an ideal CPAMP, definition of input bias current input offset current, drift, input offset, common mode rejection ratio, slew rate, universal biasing technique, Application of OP-Amp, as inverting, non-inverting amplifiers, differentiation, Integrator, scal charger and voltage follower, silicon controlled rectifier (SCR), Diac Traic and UUT (Only Qualitative study).

UNIT-IV **THE INTEL 8088/8085 MICROPROCESSOR:** Introduction the 8085 pin diagram and functions, The 8085 architecture, addressing modes, the 8080/8085 instruction set, the 8080/8085 data transfer instructions, the 8080/8085 arithmetic instructions, the 8080/8085 logical the 8080/8085 stack, I/O and machine controlled instructions.

UNIT-V **PROGRAMMING THE MICROPROCESSOR:** Machine and assembling language simplified instruction set, Instruction set, arithmetic operation, Instruction set logical operations, instruction set data transfer poeration, instruction set branch operations, instruction subroutine all and return operations, instruction set miscellaneous operations, writing a program, addressing modes, program branching, program looping using subroutines.

Programming the 8080/8085 microprocessor: Introduction straight-line programs looping programs, mathematical programs.

**B.Sc.Part-III**
**INFORMATION TECHNOLOGY**
**PAPER-II**
**FUNDAMENTAL DATA STRUCTURE**

**UNIT-I** **Introduction to Data Structure:** The concept of data structure, Abstract data structure, Analysis of Algorithm, The concept of list.

**Stacks and Queues:** Introduction to stack & primitive operation on stack, stack as an abstract data type, Multiple Stack, Stacks application: infix, post fix, and Recursion, Introduction to queues, Primitive Operations on the Queues, Queue as an abstract data type, Circular Queue, Dequeue, Priority Queue.

**UNIT-II** **Linked List:** Introduction to the linked list of stacks, The linked of queues, Header modes, Doubly linked list, Circular linked List, Stacks & Queues as a Circular linked list Application of linked list.

**UNIT-III** Trees: Basic Terminology, Binary Trees, Tree Representations as Array & Linked list, Binary tree representation, Traversal of Binary trees: In order, Preorder & post order. Application of Binary tree, Threaded binary tree, B-Tree & Height balanced tree, representation of $B^+$ & B* trees, Binary tree representation of trees, counting binary trees, 2-3 Trees algorithm or manipulating 2-3 Trees.

**UNIT-IV** Searching & Sorting: Sequential Searching, Binary search, Insertion sort, Selection fort, Quick sort, Bubble sort, Heap sort, Comparison of sorting methods.

**UNIT-IV** Tables & graphs: Hash Table, Collision resolution Techniques, Introduction to graphs, Definition, Terminology, Directed, Undirected & Weighted graph, Representation of graphs Graph Traversal Depth first & Breadth first search, Spanning Trees, minimum sparning Tree, The basic, Greedy Strategy for computing Algorithm of Kruskal and prims.

**TEXT & REFERENCE BOOK:**


1. Fundamental of Data Structure : By S. Sawhney & Horowith
2. Data Structure : By Trembley & Sorrenson.
3. Data Structure Using Pascal : By Tannenbaum & Alugenstein
4. Data Structure : By lipschuists (Schaume's Outline Series Mcgraw Hill Publication)
5. Fundamental of Computer Algorithm : By Ellis Horowitz an Sartaj Sawhney.


**PRACTICAL WORK**

1. The sufficient practical work should be done for understanding the date structure with C++.
2. The sufficient practical work must be performed on stacks queues linked list, trees etc.
3. All practical works should prepared in form of print outs and voluated while practical examination.

**B.A./B.Sc. Part-III**
**MATHEMATICS**

There shall be three theory papers. Two compulsory and one optional. Each paper carrying 50 marks is divided into five units and each unit carry equal marks.

**B.A./B.Sc. Part-III**
**PAPER - I**
**ANALYSIS**

**REAL ANALYSIS**

**UNIT-I** Series of arbitrary terms. Convergence, divergence and oscillation. Abel's and Dirichlet's test. Multiplication of series. Double series. Partial derivation and differentiability of real-valued functions of two variables. Schwarz and Young's theorem. Implicit function theorem. Fourier series. Fourier expansion of piecewise monotonic functions.

**UNIT-II** Riemann integral. Inerrability of continuous and monotonic functions. The fundamental theorem of integral calculus. Mean value theorems of integral calculus. Improper integrals and their convergence. Comparison tests. Abel's and Dirichlet' tests. Frullani's integral. Integral as a function of a parameter. Continuity, derivability and integrability of an integral of a function of a parameter.

**COMPLEX ANALYSIS**

**UNIT-III** Complex numbers as ordered pairs. Geometrical representation of complex numbers. Stereographic projection. Continuity and differentiability of complex functions. Analytic functions. Cauchy- Riemann equations. Harmonic functions. Elementary functions. Mapping by elementary functions. Mobius transformations. Fixed points, Cross ratio. Inverse points and critical mappings. Conformal mappings.

**METRIC SPACES**

**UNIT-IV** Definition and examples of metric spaces. Neighborhoods, Limit points, Interior points, Open and Closed sets, Closure and interior. Boundary points, Sub-space of a metric space. Cauchy sequences, Completeness, Cantor's intersection theorem. Contraction principle, construction of real numbers as the completion of the incomplete metric space of rationals. Real numbers as a complete ordered field.

**UNIT-V** Dense subsets. Baire Category theorem. Separable, second countable and first countable spaces. Continuous functions. Extension theorem. Uniform continuity, isometry and homeomorphism. Equivalent metrics. Compactness, sequential compactness. Totally bounded spaces. Finite intersection property. Continuous functions and Compact sets, Connectedness, Components, Continuous functions and Connected sets.

**REFERENCES:**


1. T.M. Apostol, Mathematical Analysis, Narosa Publishing House, New Delhi, 1985.
2. R.R. Goldberg, Real Analysis, Oxford & IBH publishing Co., New Delhi, 1970.
3. S. Lang, Undergraduate Analysis, Springer-Verlag, New York, 1983.
4. D. Somasundaram and B. Chaudhary, A First Coarse in Mathematical Analysis, Narosa Publishing House, New Delhi, 1997.
5. Shanti Narayan, A Course of Mathematical Analysis, S. Chand & Co. New Delhi.
6. P.K. Jain and S.K. Kaushik, An introduction to Real Analysis, S. Chand & Co., New Delhi, 2000.
7. R.V. Churchill and J.W. Brown, Complex Variables and Applications, 5th Edition, McGraw- Hill, NewYork, 1990.
8. Mark J. Ablowitz and A.S. Fokas, Complex Variables : Introduction and Applications, Cambridge University Press, South Asian Edition, 1998.
9. Shanti Narayan, Theory of Functions of a Complex Variable, S. Chand & Co., New Delhi.
10. E.T. Cop son, Metric Spaces, Cambridge University Press, 1968.
11. P.K. Jain and K. Ahmad, Metric Spaces, Narosa Publishing House, New Delhi, 1996.
12. G.F. Simmons, Introduction to Topology and Modern Analysis, McGraw-Hill, 1963.

**B.A./B.Sc. Part-III**
**MATHEMATICS**
**PART - II**
**ABSTRACT ALGEBRA**

**UNIT-I** Group-Auto orphisms, inner auto orphism. Auto orphism of groups and their computations, Contumacy relation, Normalize, Counting principle and the class equation of a finite group. Center for Group of prime-order, Abelianizing of a group and its universal property. Sylow's theorems, Sylow subgroup, Structure theorem for finite Abelian groups.

**UNIT-II** Ring theory-Ring homomorphism. Ideals and quotient rings. Field of quotients of an integral domain, Euclidean rings, polynomial rings, Polynomials over the rational field. The Eisenstein criterion, polynomial rings over commutative rings, Unique factorization domain. R unique factorization domain implies so is $R[x_1, x_2 \ldots\ldots x_n]$. Modules, Sub modules, Quotient modules, Homomorphism and Isomorphism theorems.

**UNIT-III** Definition and examples of vector spaces. Subspaces. Sum and direct sum of subspaces. Linear span, Linear dependence, independence and their basic properties. Basis. Finite dimensional vector spaces. Existence theorem for bases. Invariance of the number of elements of a basis set. Dimension. Existence of complementary subspace of a finite dimensional vector space. Dimension of sums of subspaces. Quotient space and its dimension.

**UNIT-IV** Linear transformations and their representation as matrices. The Algebra of linear transformations. The rank nullity theorem. Change of basis. Dual space. Bidual space and natural isomorphism. Ad joint of a linear transformation. Eigenvalues and eigenvectors of a linear transformation. Diagonalisation. Annihilator of a subspace. Bilinear, Quadratic and Hermitian forms.

**UNIT-V** Inner Product Spaces-Cauchy-Schwarz inequality. Orthogonal vectors. Orthogonal Complements. Orthonormal sets and bases. Bessel's inequality for finite dimensional spaces. Gram-Schmidt Orthogonalization process.

**REFERENCES:**


1. I.N. Herstein, Topics in Algebra, Wiley Eastern Ltd., New Delhi, 1975.
2. N. Jacobson, Basic Algebra, Vols. I & II. W.H. Freeman, 1980 (also published by Hindustan Publishing Company).
3. Shanti Narayan, A Text Book of Modern Abstract Algebra, S.Chand & Co. New Delhi.
4. K.B. Datta, Matrix and Linear Algebra, Prentice Hall of India Pvt. Ltd., New Delhi, 2000.
5. P.B. Bhattacharya, S.K. Jain and S.R. Nagpal, Basic Abstract Algebra (2"" Edition) Cambridge University Press, Indian Edition, 1997.
6. K. Hoffman and R. Kunze, Linear Algebra, (2nd Edition), Prentice Hall. Englewood Cliffs, New Jersey, 1971.
7. S.K. Jain, A. Gunawardena and P.B. Bhattacharya, Basic Linear Algebra with MATLAB. Key College Publishing (Springer-Verlag) 2001.
8. S. Kumaresan, Linear Algebra, A Geometric Approach, Prentice-Hall of India, 2000.
9. Vivek Sahai and Vikas Bist, Algebra, Norosa Publishing House, 1997.
10. I.S. Luther and I.B.S.Passi, Algebra, Vol. I-Groups, Vol. II-Rings. Narosa Publishing House (Vol. I-1996, Vol. II-1999)
11. D.S. Malik, J.N. Mordeson, and M.K. Sen, Fundamentals of Abstract Algebra, McGraw- Hill International Edition, 1997.

**B.A./B.Sc. Part-III**
**MATHEMATICS**
**PAPER - III (OPTIONAL)**
**(I) PRINCIPLES OF COMPUTER SCIENCE**

**UNIT-I** **Data Storage** - Storage of bits. Main Memory. Mass Storage. Coding Information of Storage. The Binary System. Storing integers, storing fractions, communication errors.
**Data Manipulation** - The Central Processing Unit. The Stored-Program Concept. Programme Execution. Other Architectures. Arithmetic/Logic Instructions. Computer-Peripheral Communication.

**UNIT-II** **Operating System and Networks** - The Evolution of Operating System. Operating System Architecture. Coordinating the Machine's Activities. Handling Competition Among Process. Networks. Networks Protocol.
**Software Engineering** - The Software Engineering Discipline. The Software Life Cycle. Modularity. Development Tools and Techniques. Documentation. Software Ownership and Liability.

**UNIT-III** **Algorithms** - The Concept of an Algorithm, Algorithm Representation. Algorithm Discovery. Iterative Structures. Recursive Structures. Efficiency and Correctness. (Algorithms to be implemented in C++). **Programming Languages** - Historical Perspective. Traditional Programming Concepts, Program Units. Language Implementation. Parallel Computing. Declarative Computing.

**UNIT-IV** **Data Structures** - Arrays. Lists. Stacks. Queues. Trees. Customised Data Types. Object Oriented Programming.
**File Structure** - Sequential Files. Text Files. Indexed Files. Hashed Files. The Role of the Operating System.
**Database Structure** - General Issues. The Layered Approach to Database Implementation. The Relational Model. Object-Oriented Database. Maintaining Database Integrity. E-R models

**UNIT-V** **Artificial Intelligence** - Some Philosophical Issues. Image Analysis. Reasoning, Control System Activities. Using Heuristics. Artificial Neural Networks. Application of Artificial Intelligence.
**Theory of Computation** - Turning Machines. Computable functions. A Non computable Function. Complexity and its Measures. Problem Classification.

**REFERENCES:**

1. J. Glen Brook hear, Computer Science: An Overview, Addition -Wesley.
2. Stanley B. Lippmann, Josee Lojoie, C++ Primer (third Edition), Addison-Wesley.

**B.A./B.Sc. Part-III**
**MATHEMATICS**
**PAPER - III (OPTIONAL)**
**(II) DISCRETE MATHEMATICS**

**UNIT-I** **Sets and Propositions** - Cardinality. Mathematical Induction, Principle of inclusion and exclusion. **Computability and Formal Languages** - Ordered Sets. Languages. Phrase Structure Grammars. Types of Grammars and Languages. Permutations. Combinations and Discrete Probability.

**UNIT-II** **Relations and Functions** - Binary Relations, Equivalence Relations and Partitions. Partial Order Relations and Lattices. Chains and Antichains. Pigeon Hole Principle.
**Graphs and Planar Graphs** - Basic Terminology. Multigraphs. Weighted Graphs. Paths and Circuits. Shortest Paths. Eulerian Paths and Circuits. Travelling Salesman Problem. Planner Graphs. Trees.

**UNIT-III** **Finite State Machines** - Equivalent Machines. Finite State Machines as Language Recognizers. **Analysis of Algorithms** - Time Complexity. Complexity of Problems. Discrete Numeric Functions and Generating Functions.

**UNIT-IV** **Recurrence Relations and Recursive Algorithms** - Linear Recurrence Relations with constant coefficients. Homogeneous Solutions. Particular Solution. Total Solution. Solution by the Method of Generating Functions. Brief review of Groups and Rings.

**UNIT-V** **Boolean Algebras** - Lattices and Algebraic Structures. Duality, Distributive and Complemented Lattices. Boolean Lattices and Boolean Algebras. Boolean Functions and Expressions. Prepositional Calculus. Design and Implementation of Digital Networks. Switching Circuits.

**REFERENCES:**

1. C.L. Liu, Elements of Discrete Mathematics, (Second Edition), McGraw Hill, International Edition, Computer Science Series, 1986

**B.A./B.Sc. Part-III**
**MATHEMATICS**
**PAPER - III (OPTIONAL)**
**(III) PROGRAMMING IN C AND NUMERICAL ANALYSIS**
**(Theory & Practical)**
**Theory component will have maximum marks 30.**
**Practical component will have maximum marks 20.**

**UNIT-I** Programmer's model of a computer. Algorithms. Flow Charts. Data Types. Arithmetic and input/output instructions. Decisions control structures. Decision statements. Logical and Conditional operators. Loop. Case control structures. Functions. Recursions. Preprocessors. Arrays. Puppetting of strings. Structures. Pointers. File formatting.

**Numerical Analysis**

**UNIT-II** **Solution of Equations:** Bisection, Secant, Regula Falsi, Newton's Method, Roots of Polynomials. **Interpolation:** Lagrange and Hermite Interpolation, Divided Differences, Difference Schemes, Interpolation Formulas using Differences. Numerical Differentiation. Numerical Quadrature: Newton-Cote's Formulas. Gauss Quadrature Formulas, Chebychev's Formulas.

**UNIT-III** **Linear Equations:** Direct Methods for Solving Systems of Linear Equations (Guass Elimination, LU Decomposition, Cholesky Decomposition), Iterative Methods (Jacobi, GaussSeidel, Relaxation Methods).
**The Algebraic Eigen value problem:** Jacobi's Method, Givens' Method, Householder's Method, Power Method, QR Method, Lanczos' Method.

**UNIT-IV** **Ordinary Differential Equations:** Euler Method, Single-step Methods, Runge-Kutta's Method, Multi-step Methods, Milne-Simpson Method, Methods Based on Numerical Integration, Methods Based on Numerical Differentiation, Boundary Value Problems, Eigenvalue Problems.
**Approximation:** Different Types of Approximation, Least Square Polynomial Approximation, Polynomial Approximation using Orthogonal Polynomials, Approximation with Trigonometric Functions, Exponential Functions, Chebychev Polynomials, Rational Functions.

**Monte Carlo Methods**

**UNIT-V** Random number generation, congruential generators, statistical tests of pseudo-random numbers. Random variate generation, inverse transform method, composition method, acceptance rejection method, generation of exponential, normal variates, binomial and Poisson variates.
Monte Carlo integration, hit or miss Monte Carlo integration, Monte Carlo integration for improper integrals, error analysis for Monte Carlo integration.

**REFERENCES:**


1. Henry Mulish and Herbert L. Cooper, Spirit of C: An Introduction to Modern Programming, Jaico Publishers, Bombay.
2. B.W. Kernighan and D.M. Ritchie. The C Programming Language 2nd Edition, (ANSI features) Prentice Hall, 1989.
3. Peter A Darnel and Philip E. Margolis, C: A Software Engineering Approach, Narosa Publishing House, 1993.
4. Robert C. Hutehisonand Steven B. Just, Programming using C Language, McGraw Hill, 1988.
5. Les Hancock and Morris Krieger, The C Primer, McGraw Hill, 1988.

6. V. Rajaraman, Programming in C, Prentice Hall of India, 1994.
7. Byron S. Gottfried, Theory and Problems of Programming with C, Tata McGraw-Hill Publishing Co. Ltd., 1998.
8. C.E. Froberg, Introduction to Numerical Analysis, (Second Edition), Addison-Wesley, 1979.
9. James B. Scarborough, Numerical Mathematical Analysis, Oxford and IBH Publishing Co. Pvt. Ltd. 1966.
10. Melvin J. Maron, Numerical Analysis A Practical Approach, Macmillan publishing Co., Inc. New York, 1982.
11. M.K. Jain, S.R.K. iyengar, R.K. Jain, Numerical Methods Problems and Solutions, New Age International (P) Ltd., 1996.
12. M.K. Jain, S.R.K. iyengar, R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International (P) Ltd., 1999.
13. R.Y. Rubinstein, Simulation and the Monte Carlo Methods, John Wiley, 1981.
14. D.J. Yakowitz, Computational Probability and Simulation, Addison-Wesley, 1977.

**B.A./B.Sc. Part-III**
**MATHEMATICS**
**PAPER - III (OPTIONAL)**
**(IV) PRACTICAL**
**PROGRAMMING IN C AND NUMERICAL ANALYSIS**

**LIST OF PRACTICAL TO BE CONDUCTED...**

1. Write a program in C to find out the largest number of three integer numbers.
2. Write a program in C to accept monthly salary from the user, find and display income tax with the help of following rules :
   Monthly Salary Income Tax
   9000 or more 40% of monthly salary
   7500 or more 30% of monthly salary
   7499 or less 20% of monthly salary
3. Write a program in C that reads a year and determine whether it is a leap year or not.
4. Write a program in C to calculate and print the first n terms of Fibonacci series using looping statement.
5. Write a program in C that reads in a number and single digit. It determines whether the first number contains the digit or not.
6. Write a program in C to computes the roots of a quadratic equation using case statement.
7. Write a program in C to find out the largest number of four numbers using function.
8. Write a program in C to find the sum of all the digits of a given number using recursion.
9. Write a program in C to calculate the factorial of a given number using recursion.
10. Write a program in C to calculate and print the multiplication of given 2D matrices.
11. Write a program in C to check that whether given string palindrome or not.
12. Write a Program in C to calculate the sum of series:
$$1 + x + \frac{1}{2!}x^2 + \frac{1}{3!}x^3 + \ldots\ldots + \frac{1}{n!}x^n$$
13. Write a program in C to determine the grade of all students in the class using Structure. Where structure having following members - name, age, roll, sub1, sub2, sub3, sub4 and total.
14. Write a program in C to copy one string to another using pointer. (Without using standard library functions).
15. Write a program in C to store the data of five students permanently in a data file using file handling.

## B.Sc. Part-III

## MICROBIOLOGY

## PAPER- I

## MEDICAL MICROBIOLOGY AND IMMUNOLOGY

**UNIT-I** **AIR BORNE DISEASES**

Air borne diseases: Types- Tuberculosis, Pertussis, Diphtheria, Influenza, Small & Chicken pox, Mumps, Measles. Symptoms, treatment and prevention.

**UNIT-II** **WATER BORNE DISEASES**

Concept and cause of water borne diseases; Types, Hepatitis, Dysentery, Diarrhea, Cholera, typhoid. Symptoms, treatment and prevention.

**UNIT-III** **CLINICAL DISEASE AND DIAGNOSIS**

Clinical diseases: Diabetes, Asthma, multiple sclerosis, rheumatoid arthritis, cancer. Symptoms, Treatment and prevention.

**UNIT-IV** **BASIC CONCEPT OF IMMUNITY**

Immune system: Structure and function of the cells, tissues and organs of immune system. Types of immunity-humoral and cell-mediated, innate, acquired immunity. **Antigen-Antibody**: types, properties. Hapten, adjuvant, Immune-globulins: Structure types, Properties and their function - Theory of antibody production.

**UNIT-V** **IMMUNO DISEASE DIAGNOSIS**

Methods based on Ag-Ab interaction- precipitation, agglutination, ELISA, RIA, Immune-electrophoresis, PCR based diagnosis method for infectious diseases.

**TEXT BOOKS RECOMMENDED:**


1. Immunology: Ruby.
2. General Microbiology by Power and Daganiwala.
3. Zinssers Microbiology by K. J Wolfgang, McGraw- Hill Company.
4. Medical Microbiology; N. C. Dey and T.K. Dey, Allied agency, Calcutta.
5. Bacteriological Techniques by FJ Baker.
6. A Textbook of Microbiology; Dubey & Maheshwari; S. chand & Sons.
7. Scott's Diagnostic Microbiology by EJ Baron.

## B.Sc. Part-III

## MICROBIOLOGY

## PAPER- II

## ENVIRONMENTAL, INDUSTRIAL AND AGRICULTURAL MICROBIOLOGY

**UNIT-I** **AIR MICROBIOLOGY**

Basics of Aerobiology, Microbes in atmosphere, source of microorganism in air, droplet nuclei, infectious dust, and bio-aerosol. Factors affecting microbial survival in the air. Sampling, collection and Isolation of microbes from air.

**UNIT-II** **WATER MICROBIOLOGY**

Basic concept, water zonation, eutrophication, microbial community in natural water. Determining the quality of water- bacteriological evidence for fecal pollution, indicator of fecal pollution. Water purification methods. Disinfection of potable water supply.

**UNIT-III** **SOIL MICROBIOLOGY.**

Soil as an environmental culture medium, microbes of soil. Brief account of microbial interactions-symbiosis, mutualism, commensalism, competition, predation, parasitism. Microbiological examination of soil. Rhizosphere- concept and role of microbes, rhizosphere and non rhizosphere micro-flora. Mycorrhiza.

**UNIT-IV** **INDUSTRIAL MICROBIOLOGY.**

Introduction and brief history and scope, important microbes in various industries. Fermentation- definition, types-Aerobic and anaerobic, Batch and SSF. Important products bread, cheese, vinegar, fermented dairy products and oriented fermented food involving microbes. Microbial cells as food. SCP -mushroom cultivation, production of alcohol and fermented beverages, beer and Wine

**UNIT-V** **AGRICULTURAL MICROBIOLOGY**

History of Agricultural Microbiology; Microbes and their importance in maintenance of soil, Biogeochemical cycles, role of microbes in maintaining the fertility of soil. Bio fertilizers –Bacterial, azotobacter and vermiform compost. Soil microorganism - association with vascular plants- phyllosphere, Rhizobium, Rhizoplane associative nitrogen fixation. Bio-fertilizers - Cyanobacterial and Azolla

**TEXT BOOKS RECOMMENDED:**


1. Hugo, W.B., Russell, A.D, pharmaceutical Microbiology 4th edition. Blackwell scientific publications / Oxford.
2. Russell and Ayliffe, G. A .J (1982) Principles and practice of Disinfection, preservation and sterilization Oxford:
3. Gregory P.H. Microbiology of the atmosphere.2nd edition. Leonard Hill.
4. Food Microbiology by WC Frazier and D Westhoff.
5. Agricultural Microbiology by Bhagyaraj and Rangaswamy.
6. Bioremediation by KH Baker and DS Herson

**B.Sc. Part-III**

**MICROBIOLOGY**

**PRACTICAL**

**M. M. 50**

Isolation of bacteria from air and soil (crop fields) Isolation of fungi from air and soil Relationship between OD and CFU measurements. Measurement of fungal growth by dry weight and wet weight Study of rhizospheric and phyllospheric microbes from economically important plants. Biodegradation study of some organic molecules Microbial assessment of potable water. Determination of BOD, COD and dissolved oxygen. Determination of blood group by slide agglutination test./TLC/DLC Determination of hemoglobin. Determination of quality of milk by MBRT Isolation of Rhizobium from root nodules.

**Scheme of practical examination**

| Time 4 hour | MM- 50 |
|---|---|
| 1. Exercise on immunological test | 10 |
| 2. Exercise on water analysis | 10 |
| 3. Exercise on isolation and characterization of micro organism | 05 |
| 4. Spotting (1 to 5) | 10 |
| 5. Viva voce | 05 |
| 6. Sessional | 10 |
| | **Total- 5** |

**B.Sc. Part-III**
**PHYSICS**
**OBJECTIVES OF THE COURSE**

The undergraduate training in physics is aimed at providing the necessary inputs so as to set forth the task of bringing about new and innovative ideas/concepts so that the formulated model curricula in physics becomes in tune with the changing scenario and incorporate new and rapid advancements and multi disciplinary skills, societal relevance, global interface, self sustaining and supportive learning.

It is desired that undergraduate i.e. B.Sc. level besides grasping the basic concepts of physics should in addition have broader vision. Therefore, they should be exposed to societal interface of physics and role of physics in the development of technologies.

**EXAMINATION SCHEME:**

1. There shall be 2 theory papers of 3 hours duration each and one practical paper of 4 hours duration. Each paper shall carry 50 marks.
2. Numerical problems of at least 30% will compulsorily be asked in each theory paper.
3. In practical paper, each student has to perform two experiments one from each groups as listed in the list of experiments.
4. Practical examination will be of 4 hours duration- one experiment to be completed in 2 hours.
   The distribution practical marks as follows:
   Experiment : 15+15=30
   Viva voce : 10
   Internal assessment : 10
5. The external examiner should ensure that at least 16 experiments are in working order at the time of examination and submit a certificate to this effect.

**B.Sc. Part-III**
**PHYSICS**
**PAPER-I**
**RELATIVITY, QUANTUM MECHANICS,**
**ATOMIC MOLECULAR AND NUCLEAR PHYSICS**

**UNIT-I** Reference systems, inertial frames, Galilean invariance propagation of light, Michelson-Morley experiment, search for ether. Postulates for the special theory of relativity, Lorentz transformations, length contraction, time dilation, velocity addition, variation of mass with velocity, mass-energy equivalence, particle with zero rest mass.

**UNIT-II** Origin of the quantum theory : Failure of classical physics to explain the phenomena such as black-body spectrum, photoelectric effect, Compton effect, Wave-particle duality, uncertainty principle, de Broglie's hypothesis for matter waves, the concept of Phase and group velocities, experimental demonstration of mater waves. Davisson and Garner's experiment. Consequence of de Broglie's concepts, Bohr's complementary Principle, Bohr's correspondence principle, Bohr's atomic model, energies of a particle in a box, wave packets. Consequence of the uncertainty relation, gamma ray microscope, diffraction at a slit.

**UNIT-III** Quantum Mechanics: Schrodinger's equation, Statistical interpretation of wave function, Orthogonality and normalization of wave function, Probability current density, Postulator basis of quantum mechanics, operators, expectation values, Ehrenfest's theorem, transition probabilities, applications to particle in a one and three dimensional boxes, harmonic oscillator in one dimension, reflection at a step potential, transmission across a potential barrier.

**UNIT-IV** Spectra of hydrogen, deuteron and alkali atoms spectral terms, doublet fine structure, screening constants for alkali spectra for s, p, d and f states, selection rules. Discrete set of electronic energies of molecular, quantization of vibration and rotational energies, determination of inter-nuclear distance, pure rotational and rotation vibration spectra. Dissociation limit for the ground and other electronic states, transition rules for pure vibration and electronic vibration spectra. Raman effect, Stokes and anti-Stokes lines, complimentary character of Raman and infrared spectra, experimental arrangements for Raman spectroscopy.

**UNIT-5** Structure of nuclei:- Basic Properties of Nuclei: (1) Mass, (2) Radii, (3) Charge, (4) Angular Momentum, (5) Spin, (5) Magnetic Moment ($\mu$), (6) Stability and (7) Binding Energy, Nuclear Models:- Liquid Drop Model, Mass formula, Shell Model, Types of Nuclear reactions, laws of conservation, Q-value of reactions, Interaction of Energetic particles with matter, Ionization chamber, GM Counter, Cloud Chambers, Fundamental Interactions, Classification of Elementary Particles, Particles and Antiparticles, Baryons, Hyperons, Leptons, and Mesons, Elementary Particle Quantum Numbers: Baryon Number, Lepton Number, Strangeness, Electric Charge, Hypercharge and Is spin, introductory idea of discovery of High's Boson.

**TEXT AND REFERENCE BOOKS:**

1. H.S. Mani and G.K. Mehta: "Introduction to Modern Physics"" (Affiliated East-West Press, 1989).

2. A Beiger, "Prospective of Modern Physics".
3. H.E. White, Introduction to Atomic Physic".
4. Barrow, "Introduction to Molecular Physics".
5. R.P. Feynman, R.B. Leighton and M Sands, "The Feynman Lectures on Physics", Vol.III (B.I. Publications, Bombay, Delhi, Calcutta, Madras).
6. T.A. Littlefield and N Thorley, "Atomic and Nuclear Physics" (Engineering Language Book Society)
7. H.A. Engel, "Introduction to Nuclear Physics", (Addision-Wesly)
8. Eisenberg and Renwick, "Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles" (John Wiley)
9. D.P. Khandelwal, "Optics and Atomic Physics", (Himalaya Publishing House, Bombay, 1988).
10. Quarks and Leptons, F. Halzen and A.D. Martin, Wiley India, New Delhi, 1984.
11. Radiation detection and measurement, G.F. Knoll (John Wiley & Sons, 2000).
12. Theoretical Nuclear Physics, J.M. Blatt & V.F.Weisskopf (Dover Pub. Inc., 1991).

**B.Sc. Part-III**
**PHYSICS**
**PAPER-II**
**SOLID STATE PHYSICS, SOLID STATE DEVICES AND ELECTRONICS**

**UNIT-I** Amorphous and crystalline solids, Elements of symmetry, seven crystal system, Cubic lattices, Crystal planes, Miller indices, Laue's equation for X-ray diffraction, Bragg's Law, Bonding in solids, classification. Cohesive energy of solid, Made lung constant, evaluation of Parameters, Specific heat of solids, classical theory (Dulong-Petit's law), Einstein and Debye theories, Vibration modes of one dimensional monatomic lattice, Dispersion relation, Brillion Zone.

**UNIT-II** Free electron model of a metal, Solution of one dimensional Schrödinger equation in a constant potential, Density of states, Fermi Energy, Energy bands in a solid (Kronig-Penny model without mathematical details), Difference between Metals, Insulator and Semiconductors, Hall effect, Die, Para and Ferromagnetism, Langevin's theory of die and para-magnetism, Curie- Weiss's Law, Qualitative description of Ferromagnetism (Magnetic domains), B-H curve and Hysteresis loss.

**UNIT-III** Intrinsic and extrinsic semi conductors, Concept of Fermi level, Generation and recombination of electron hole pairs in semiconductors, Mobility of electrons and holes, drift and diffusion currents, p-n junction diode, depletion width and potential barrier, junction capacitance, I-V characteristics, Tunnel diode, Zinger diode, Light emitting diode, solar cell, Bipolar transistors, pnp and npn transistors, characteristics of transistors, different configurations, current amplification factor, FET and MOSFET Characteristics.

**UNIT-IV** Half and full wave rectifier, rectifier efficiency ripple factor, Bridge rectifier, Filters, Inductor filter, L and $\pi$ section filters, Zinger diode, regulated power supply using zinger diode, Applications of transistors, Bipolar Transistor as amplifier, h-parameter, h-parameter equivalent circuit, Transistor as power amplifier, Transistor as oscillator, principle of an oscillator and Bark House's condition, requirements of an oscillator, Wein-Bridge oscillator and Hartley oscillator.

**UNIT-V** Digital Circuits: Difference between Analog and Digital Circuits, Binary Numbers, Decimal to Binary and Binary to Decimal Conversion, AND, OR and NOT Gates (Realization using Diodes and Transistor), NAND and NOR Gates as Universal Gates, XOR and XNOR Gate, De Morgan's Theorems, Boolean Laws, Simplification of Logic Circuit using Boolean Algebra, Digital to Analog Converter, Analog to Digital Converter.

**TEXT AND REFERENCE BOOKS:**


1. Introduction to solid state physics: C. Kittle.
2. Solid State Physics: A.J. Dekkar.
3. Electronic Circuits: Mottershead.
4. Electronic Circuits: Millman and Halkias.
5. Semiconductor Devices: S.M. Size.
6. Electronic devices: T.L. Floyd.
7. Device and Circuits: J. Millman and C. Halkias.
8. Electronic Fundamental and Applications: D. Chatopadhyay and P.C. Rakshit.
9. Electricity and Magnetism: K.K. Tiwari.

**B.Sc. Part-III**
**PHYSICS**
**PRACTICALS**
**Minimum 16 (Eight from each group)**
**Experiments out of the following or**
**Similar experiments of equal standard**

1. Determination of Planck is constant.
2. Determination of e/m by using Thomson tube.
3. Determination of e by Millikan's methods.
4. Study of spectra of hydrogen and deuterium ( Rydberg constant and ratio of masses of electron proton).
5. Absorption spectrum of iodine vapor.
6. Study of alkali or alkaline earth spectra using a concave grating.
7. Study of Zeeman effect for determination of a Lande g-factor.
8. Analysis of a given band spectrum.
9. Study of Raman spectrum using laser as an excitation source.
10. Study of absorption of alpha and beta rays.
11. Study of statistics in radioactive measurement.
12. Goniometric study of crystal faces.
13. Determination of dielectric constant.
14. Hysteresis curve of transformer core.
15. Hall-probe method for measurement of magnetic field.
16. Specific resistance and energy gap of semiconductor.
17. Characteristics of transistor.
18. Characteristics of tunnel diode.
19. Study of voltage regulation system.
20. Study of regulated power supply.
21. Study of lissajous figures using CRO.
22. Study of VTVM.
23. Study of RC and TC coupled amplifiers.
24. Study of AF and RF oscillators.
25. Find roots of f(x) = 0 by using Newton-Rap son Method.
26. Find root of f(x) = 0 by using secant method.
27. Integration by Simpson rule.
28. To find the value of V at
29. String manipulations.
30. Towers of Hanoi (Non-recursive).
31. Finding first four perfect numbers.
32. Quadratic interpolation using Newton's forward-difference formula of degree two.

**TEXT AND REFERENCE BOOKS:**


1. B.G. Strachan, Solid state electronics devices II edition (Prentice-Hall of India New Delhi 1986)
2. W.D. Stanley, Electronics devices, circuits and applications (Prentice-Hall new jersey, USA 1988).
3. S. Lipschutz and A Poe; Schaum's outline of theory and problems of programming with Fortran (Mc Graw-Hill Book Co. Singapore, 1986).
4. C Dixon, Numerical Analysis.

**B.Sc. Part-III**
**ZOOLOGY**
**PAPER-I**
**ECOLOGY, ENVIRONMENTAL BIOLOGY:**
**TOXICOLOGY, MICROBIOLOGY AND MEDICAL ZOOLOGY**

**UNIT- I** **(Ecology)**

- Aims and scopes of ecology
- Major ecosystems of the world-Brief introduction
- Population- Characteristics and regulation of densities
- Communities and ecosystem
- Bio-geo chemical cycles
- Air & water pollution
- Ecological succession

**UNIT- II** **(Environmental Biology)**

- Laws of limiting factor
- Food chain in fresh water ecosystem
- Energy flow in ecosystem- Trophic levels
- Conservation of natural resources
- Environmental impact assessment

**UNIT-III** **(Toxicology)**

- Definition and classification of Toxicants
- Basic Concept of toxicology
- Principal of systematic toxicology
- Heavy metal Toxicity (Arsenic, Mercury, Lead, Cadmium)
- Animal poisons- snake venom, scorpion & bee poisoning
- Food poisoning

**UNIT-IV** **(Microbiology)**

- General and applied microbiology
- Microbiology of domestic water and sewage
- Microbiology of milk & milk products
- Industrial microbiology: fermentation process, production of penicillin, alcoholic beverages', bioleaching.

**UNIT-V** **(Medical Zoology)**

- Brief introduction to pathogenic microorganisms, Ricketssia, Spirochetes, AIDS and Typhoid
- Brief account of life history & pathogen city of the following pathogens with reference to man: prophylaxis & treatment
- Pathogenic protozoan's- Endameba, Trypanosome & Plasmodium
- Pathogenic helminthes- Schist soma
- Nematode pathogenic parasites of man
- Vector insects

**B.Sc. Part-III**
**ZOOLOGY**
**PAPER-II**
**GENETICS, CELL PHYSIOLOGY, BIOCHEMISTRY, BIOTECHNOLOGY AND BIOTECHNIQUES**

**UNIT-I** **(Genetics)**

- Linkage & linkage maps, Sex Determination and Sex Linkage
- Gene interaction- Incomplete dominance & Co dominance, Supplementary gene, Complementary gene, Epitasis Lethal gene, Pleiotropic gene and multiple alleles.
- Mutation: Gene and chromosomal mutation
- Human genetics: chromosomal alteration: Down, Edward, Patau, Turner and Klinefelter Syndrome Single gene disorders: Alkaptonuria, Phenylketonuria, Sickle cell anemia, albinism and color blindness

**UNIT-II** **(Cell Physiology)**

- General idea about pH & buffer
- Transport across membrane: Diffusion and Osmosis
- Active transport in mitochondria & endoplasmic reticulum
- Enzymes-classification and Action

**UNIT-III** **(Biochemistry)**

- Amino acids & peptides- Basic structure & biological function
- Carbohydrates & its metabolism-Glycogenesis; Gluconeogenesis; Glycolysis; Glycogenolysis; Cosi-cycle
- Lipid metabolism- Oxidation of glycerol; Oxidation of fatty acids
- Protein Catabolism- Deamination, transamination, transmethylation

**UNIT-IV** **(Biotechnology)**

- Application of Biotechnology
- Recombinant DNA & Gene cloning
- Cloned genes & other tools of biotechnology (Tissue culture, Hybridism, Transgenic Animals and Gene library)

**UNIT- V** **(Biotechniques)**

1. Principles & techniques about the following:
   i. pH meter
   ii. Colorimeter
   iii. Microscopy- Light microscopes: Compound, Phase contrast & Electron microscopes
   iv. Centrifuge
   v. Separation of bimolecular by chromatography & electrophoresis

**B.Sc. Part-III**
**ZOOLOGY**
**PRACTICAL**

The practical work in general shall be based on syllabus prescribed in theory.
The candidates will be required to show knowledge of the following:

- Estimation of population density, percentage frequency, relative density.
- Analysis of producers and consumers in grassland.
- Detection of gram-negative and gram-positive bacteria.
- Blood group detection (A,B,AB,O)
- R. B. C. and W.B.C count
- Blood coagulation time
- Preparation of hematin crystals from blood of rat
- Observation of Drosophila, wild and mutant.
- Chromatography-Paper or gel.
- Colorimetric estimation of Protein.
- Mitosis in onion root tip.
- Biochemical detection of Carbohydrate, Protein and Lipid.
- Study of permanent slides of parasites, based on theory paper.
- Working principles of pH meter, colorimeter, centrifuge and microscope.

**Scheme of marks distribution** **Time: 3:30hrs**

| | |
|---|---|
| • Hematological Experiment | 08 |
| • Ecological Experiment: Grassland Ecosystem/ Population Density/Frequency/relative density | 06 |
| • Bacterial staining | 05 |
| • Biochemical experiment | 06 |
| • Practical based on Instrumentation (Chromatography/ pH meter/microscope/centrifuge. | 05 |
| • Spotting (5 spots) | 10 |
| • Viva | 05 |
| • Sessional | 05 |

**B.Sc.Part-III**
**INFORMATION TECHNOLOGY**
**PAPER-I**
**AMPLIFIERS AND OSCILIATORS**

**UNIT-I** **POWER AMPLIFIER:** Classification of power amplifiers, requirement of power amplifiers, single ended class A power amplifier, and its efficiency, transformer coupled power amplifier, power dissipation curve, harmonic dissipation curve, harmonic distortion in push pull power amplifier, power and efficiency calculation for push pull for push pull power amplifier, Distortion in push pull power amplifier, Advantages of push pull power amplifier.

**UNIT-II** **FEEDBACK AMPLIFIERS AND OSCILIATORS:** Feedback in amplifiers, types of feedback positive, and negative feedback. Derivation of input and output impedance in voltage and current series feedback. Advantage of negative feedback. Positive feedback. Berkhauson criteria for sustained oscillator. RF oscillators-Hartley oscillator, colpetts oscillators (Qualtitative study) relaxation oscillators, Multivibraton- As table, Monostable.

**UNIT-III** **OPERATIONAL AMPLIFIER AND POWER CONTROL DEVICES:** Differential amplifier, operational amplifier, Characteristics of an ideal CPAMP, definition of input bias current input offset current, drift, input offset, common mode rejection ratio, slew rate, universal biasing technique, Application of OP-Amp, as inverting, non-inverting amplifiers, differentiation, Integrator, scal charger and voltage follower, silicon controlled rectifier (SCR), Diac Traic and UUT (Only Qualitative study).

**UNIT-IV** **THE INTEL 8088/8085 MICROPROCESSOR:** Introduction the 8085 pin diagram and functions, The 8085 architecture, addressing modes, the 8080/8085 instruction set, the 8080/8085 data transfer instructions, the 8080/8085 arithmetic instructions, the 8080/8085 logical the 8080/8085 stack, I/O and machine controlled instructions.

**UNIT-V** **PROGRAMMING THE MICROPROCESSOR:** Machine and assembling language simplified instruction set, Instruction set, arithmetic operation, Instruction set logical operations, instruction set data transfer poeration, instruction set branch operations, instruction subroutine all and return operations, instruction set miscellaneous operations, writing a program, addressing modes, program branching, program looping using subroutines.

Programming the 8080/8085 microprocessor: Introduction straight-line programs looping programs, mathematical programs.

**B.Sc.Part-III**
**PAPER-II**
**FUNDAMENTAL DATA STRUCTURE**

**UNIT-I** **Introduction to Data Structure:** The concept of data structure, Abstract data structure, Analysis of Algorithm, The concept of list.
**Stacks and Queues:** Introduction to stack & primitive operation on stack, stack as an abstract data type, Multiple Stack, Stacks application: infix, post fix, and Recursion, Introduction to queues, Primitive Operations on the Queues, Queue as an abstract data type, Circular Queue, Dequeue, Priority Queue.

**UNIT-II** **Linked List:** Introduction to the linked list of stacks, The linked of queues, Header modes, Doubly linked list, Circular linked List, Stacks & Queues as a Circular linked list Application of linked list.

**UNIT-III** Trees: Basic Terminology, Binary Trees, Tree Representations as Array & Linked list, Binary tree representation, Traversal of Binary trees: In order, Preorder & post order. Application of Binary tree, Threaded binary tree, B-Tree & Height balanced tree, representation of $B^+$ & B* trees, Binary tree representation of trees, counting binary trees, 2-3 Trees algorithm or manipulating 2-3 Trees.

**UNIT-IV** Searching & Sorting: Sequential Searching, Binary search, Insertion sort, Selection fort, Quick sort, Bubble sort, Heap sort, Comparison of sorting methods.

**UNIT-IV** Tables & graphs: Hash Table, Collision resolution Techniques, Introduction to graphs, Definition, Terminology, Directed, Undirected & Weighted graph, Representation of graphs Graph Traversal Depth first & Breadth first search, Spanning Trees, minimum sparning Tree, The basic, Greedy Strategy for computing Algorithm of Kruskal and prims.

**TEXT & REFERENCE BOOK:**


1. Fundamental of Data Structure : By S. Sawhney & Horowith
2. Data Structure : By Trembley & Sorrenson.
3. Data Structure Using Pascal : By Tannenbaum & Alugenstein
4. Data Structure : By lipschuists (Schaume's Outline Series Mcgraw Hill Publication)
5. Fundamental of Computer Algorithm : By Ellis Horowitz an Sartaj Sawhney.


**PRACTICAL WORK**

1. The sufficient practical work should be done for understanding the date structure with C++.
2. The sufficient practical work must be performed on stacks queues linked list, trees etc.
3. All practical works should prepared in form of print outs and voluated while practical examination.

**B.A./ B.Sc. Part - III**
**GEOGRAPHY**
**PAPER - I**
**REMOTE SENSING AND GIS**

**Max. Marks: 50**

**UNIT I** Basics of Remote Sensing: definition, history, and Scope; Electro-magnetic Radiation: Characteristics, Spectral regions and Bands; Interaction with earth surface features and atmosphere; Spectral Signature.

**UNIT II** Types of Remote Sensing: Air borne and Space borne; Aerial photos: Types and Characteristics; Remote Sensing satellites: Platforms and sensors: active and passive, sensor characteristics: spatial resolution, spectral resolution, radiometric resolution, temporal resolution. Product.

**UNIT III** Visual and Digital image processing techniques; Remote Sensing application in resource mapping and environmental monitoring, remote sensing in India: development and Growth. Indian Satellites, Space Organizations and data products.

**UNIT IV** Introduction of GIS: Definition of Geoinformatics, Scope and Importance of Geoinformatics, History of GIS, Components of GIS, Functions of GIS,GIS tasks- Input, Manipulation, Management, Query analysis, Visualization, Top sheets, Surveying, Aerial photographs ,Satellite data and images, Data types-Spatial and Non spatial.

**UNIT V** Data model and data analysis: Raster data and their characteristics, Vector data and their characteristics, Raster data analysis- grid cells or Pixels. Vector data analysis- Spatial data, Generation in Vector Format, Spatial and Non –Spatial data Management. Spatial information Technology

**Books Recommended:**


1. Bhatta, B. (2010): Remote Sensing and GIS, Oxford University Press, New Delhi.
2. Campbell, J.B. (2002): Introduction to Remote Sensing. 5th edition, Taylor and Francis, London
3. Curran, P.J. (1985): Principles of Remote Sensing, Longman, London
4. Kang-stung Chang (2003) Geographic Information Systems, Tata McGraw Hill, New Delhi
5. Lille sand, T.M. and Kiefer, R.W. (2000): Remote Sensing and Image Interpretation. 4th edition. John Wiley and Sons, New York
6. Lo Albert, C.P., and Young, K.W (2003) Concepts and Techniques of Geographical Information Systems, Prentice Hall of India Pvt. Ltd., New Delhi.
7. Nag Prithvish and Kudrat M. (1998): Digital Remote Sensing, Concept Publishing Company, New Delhi
8. Star J, and J. Estes, (1994), Geographic Information Systems: An Introduction, Prentice Hall, New Jersey.
9. Williams J. (1995): Geographic information from space, John Wiley and Sons, England,

**B.A./ B.Sc. Part - III**
**GEOGRAPHY**
**PAPER - II**
**GEOGRAPHY OF CHHATTISGARH**

**Max. Marks: 50**

**UNIT I** Physical Features: Geological Structure, Relief and Physiographic Regions, Drainage, Climate.

**UNIT II** Natural Resources : Soils – Types, characteristics and their Distribution. Water Resources (Major Irrigation and Hydel Power Projects), Forests-types, Distribution, Conservation of Forest. Mineral Resources-iron-ore, Coal, Dolomite Lime stone, Bauxite, etc. Power Resources of Chhattisgarh.

**UNIT III** Agriculture and Populations – Agriculture: Cereals, Pulses and other crops. Population: Growth, Distribution, and Density; Tribal Populations; and Urban and Rural Population.

**UNIT IV** Industries - Iron and Steel, Cement, Sugar, Aluminum; Industrial Regions of Chhattisgarh.

**UNIT V** Trade and Transport, Tourism, Socio-Economic Development of Chhattisgarh.

**Books Recommended:**


1. Jha, Vibhash Kumar and Saumya Naiyyar (2013) Chhattisgarh Samagra, Chhattisgarh Rajya Hindi Granth Academic, Raipur
2. Kumar, Pramila (2003): Chhattisgarh Ek Bhaugolik Addhyayan. Madhya Pradesh Hindi Granth Academic, Bhopal
3. Nagesh Jitendra and at all (2014): Chhattisgarh Sandarbh 2014 Jansanmpark Vibhag, C.G. Govt., Raipur
4. Tiwari, Vijay Kumar ( ): Geography of Chhattisgarh, Himalaya Publishing House, Pvt. Ltd
5. Tripathi, Kaushlendra and Pursottam Chandrakar (2001): Geography of Chhattisgarh, Sharda prakashan, Aazad Nagar , Bilaspur.
6. Verma ,L.N. (2017): Geography of Chhattisgarh, Madhya Pradesh Hindi Granth Academic, Bhopal

**B.A./ B.Sc. Part - III**
**GEOGRAPHY**
**PAPER - III**
**PRACTICAL GEOGRAPHY**

**Max. Marks: 50**

**SECTION-A**
**MAP READINGS AND INTERPRETATION** **(M.M. 20)**

**UNIT-I** Graphical Representation: Band graph, Climograph, Square root, Cube-root.

**UNIT-II** Topographical Sheets: Classification and numbering system (National and International), Interpretation of Topographical Sheets with respect to cultural and physical features.

**UNIT-III** Satellite Imageries: Describing the Marginal Information, Image interpretation: Visual Methods –Landuse /Land cover Mapping. Use and Application of GPS.

**SECTION B**
**SURVEYING AND FIELD REPORT** **(M.M.20)**

**UNIT-IV** Surveying: Plane Table Survey, Basic Principles of plane table surveying, Plane table survey including intersection and resection.

**UNIT-V** Field work and field report: physical, social and economic survey of a micro-region.

**PRACTICAL RECORD AND VIVA VOCE** **(M.M.10)**

**BOOKS RECOMMENDED:**


1. Archer, J.E. and Dalton, T.H. (1968): Field Work in Geography. William Clowes and Sons Ltd. London and Beccles.
2. Bolton, T. and Newbury, P.A. (1968): Geography through Fieldwork. Brandford Press, London.
3. Campell, J. B. (2003): Introduction to Remote Sensing. 4th edition. Taylor and Francis, London.
4. Chanel, D. D. (2004): Remote Sensing and Geographical Information System(in Hindi), Sharda Pustak Bhawan, Allahabad
5. Cracknell, A. and Ladson, H. (1990): Remote Sensing Year Book. Taylor and Francis, London.
6. Curran, P.J. (1985): Principles of Remote Sensing. Longman, London.
7. Davis, R.E. and Foote, F.S. (1953): Surveying, 4th edition, McGraw Hill Publication, New York
8. Deekshatulu, B.L. and Rajan, Y.S. (ed.) (1984): Remote Sensing. Indian Academy of Science, Bangalore.
9. Floyd, F. and Sabins, Jr. (1986): Remote Sensing: Principles and Interpretation. W.H. Freeman, New York.
10. Gautam, N.C. and Radhaswamy, V. (2004). Land Use/ Land Cover and Management Practices in India. B.S. Publication., Hyderabad.
11. Jensen, J.R. (2004): Remote Sensing of the Environment: An Earth Resource Perspective. Prentice-Hall, Englewood Cliffs, New Jersey. Indian reprint available.
12. Jones, P.A.(1968): Fieldwork in Geography, Longmans, Green and Company Ltd., First Publication, London
13. Kanetker, T.P. and Kulkarni, S.V.(1967): Surveying and Leveling, Vol I and II V.G. Prakashan, Poona.

14. Lille sand, T.M. and Kiefer, R.W. (2000): Remote Sensing and Image Interpretation. John Wiley and Sons, New York.
15. Monk house, F. J. (1985): Maps and Diagrams. Methuen, London.
16. Nag, P. (ed.) (1992): Thematic Cartography and Remote Sensing. Concept Publishing Company, New Delhi.
17. Natrajan, V. (1976): Advanced Surveying, B.I. Publications., Mumbai.
18. Rampal, K.K. (1999): Handbook of Aerial Photography and Interpretation. Concept Publishing. Company, New Delhi.
19. Raisz, E. (1962): Principles of Cartography, McGraw Hill, New York.
20. Robinson, A. H., Sale. R. D., Morrison, J. L. and Muehrcke, P. C. (1984): Elements of Cartography. 5th edition, John Wiley and Sons, Inc. New York.
21. Sarkar, A. K. (1997): Practical Geography: A Systematic Approach. Orient Longman, Kolkata
22. Sharma, J. P. (2001): Prayogik Bhugol., Rastogi Publication, Meerut 3rd. edition.
23. Singh, R.L. and Singh Rana P.B. (1993): Elements of Practical Geography. (Hindi and English editions). Kalyani Publishers, New Delhi.
24. Stoddard, Robert H. (1982): Field Techniques and Research Methods in Geography. Kendall/Hunt Pub. Dubuque IO.

# बी.ए./बी.एस.सी. – तृतीय वर्ष
## भूगोल
## प्रश्नपत्र – प्रथम
## सुदूर संवेदन एवं भैगोलिक सूचना प्रणाली

**अधिकतम अंक: 50**

**इकाई–1** सुदूर संवेदन का अर्थ तथा आधारभूत संकल्पना : परिभाषा, इतिहास, एवं विषय क्षेत्र; विद्युत चुम्बकीय विकिरण : विशेषताएँ, वर्णक्रमीय (SPECTRAL) प्रदेश एवं बैण्ड; पृथ्वी के धरातल एवं वायुमण्डल के साथ विकिरण अर्जा की अन्योन्यक्रिया, वर्णक्रमीय (SPECTRAL) लक्षण ।

**इकाई–2** सुदूर संवेदन के प्रकार : वायु जनित एवं अंतरिक्ष जनित; हवाई छायाचित्र : प्रकार एवं विशेषताएँ; सुदूर संवेदन उपग्रह : प्लेटफार्म एवं संवेदक : सक्रिय एवं निष्क्रय, संवेदक की विशेषताएँ : स्थानिक विभेदन, वर्णक्रमीय (SPECTRAL) विभेदन, रेड़ियोमेट्रिक विभेदन, अल्पकालिक विभेदन, उत्पाद ।

**इकाई–3** चाक्षुष एवं अंकीय बिम्ब प्रक्रियान्वयण तकनीक; संसाधन मानचित्रण एवं पर्यावरण नियंत्रण में सुदूर संवेदन अनुप्रयोग, भारत में सुदूर संवेदन; उद्दभव एवं विकास।

**इकाई–4** भौगोलिक सूचना प्रणाली का परिचय : भूसूचना की परिभाषा, भूसूचना का महत्व एवं विषय क्षेत्र, भौगोलिक सूचना प्रणाली का इतिहास, जी0 आई0 एस0 की संकल्पना, जी0 आई0 एस0 के कार्य – आंकड़ा प्रवेश, संचालन, परिचालन, प्रबंधन, त्रुटि संसूचन, विश्लेषण एवं प्रदर्शन, धरातलपत्रक, सर्वेक्षण, हवाई बिम्ब, उपग्रह आंकड़े एवं बिम्ब, आकड़ो के प्रकार धरातलीय एवं अधरातलीय या लाक्षाणिक ।

**इकाई–5** आंकड़ा मॉडल एवं आंकड़ा विश्लेषण : रॉस्टर आंकड़ा एवं उसकी विशेषताएँ, वेक्टर आंकड़ा एवं उसकी विशेषताएँ, रास्टार आंकड़ा विश्लेषण : ग्रिड सेल अथवा पिक्सल, विक्टर आंकड़ा विश्लेषण धरातलीय आकड़ा, विक्टर प्रारुप की रचना धरातलीय एवं अधरातलीय आंकड़ा प्रबंधन, धरातलीय सूचना तकनीक ।

**BOOKS RECOMMENDED:**


1. Bhatta, B. (2010): Remote Sensing and GIS, Oxford University Press, New Delhi.
2. Campbell, J.B. (2002): Introduction to Remote Sensing. 5th edition, Taylor and Francis, London
3. Curran, P.J. (1985): Principles of Remote Sensing, Longman, London
4. Kang-stung Chang (2003) Geographic Information Systems, Tata McGraw Hill, New Delhi
5. Lille sand, T.M. and Kiefer, R.W. (2000): Remote Sensing and Image Interpretation. 4th edition. John Wiley and Sons, New York
6. Lo Albert, C.P., and Young, K.W (2003) Concepts and Techniques of Geographical Information Systems, Prentice Hall of India Pvt. Ltd., New Delhi.
7. Nag Prithvish and Kudrat M. (1998): Digital Remote Sensing, Concept Publishing Company, New Delhi
8. Star J, and J. Estes, (1994), Geographic Information Systems: An Introduction, Prentice Hall, New Jersy.
9. Williams J. (1995): Geographic information from space, John Wiley and Sons, England,
10. चौनियाल, देवी दत्त (2004), सुदूर संवेदन एवं भौगोलिक सूचना प्रणाली, शारदा पुस्तक भवन, इलाहाबाद–2.

बी.ए. / बी.एस.सी. – तृतीय वर्ष
भूगोल
प्रश्न पत्र–द्वितीय
छत्तीसगढ़ का भूगोल

अधिकतम अंक : 50

**इकाई–1** भौतिक स्वरूप भौमिकीय संरचना उच्चावच, भूआकृतिक प्रदेश, अपवाह, जलवायु ।

**इकाई–2** प्राकृतिक संसाधन–मिट्टी, प्रकार, विशेषताएँ, वितरण, जलसंसाधनः प्रमुख सिंचाई और बहुउद्देशीय परियोजनांए, वन : प्रकार, वितरण, वनों का संरक्षण, खनिज संसाधन – लौह अयस्क, कोयला डोलोमाइट, चुना पत्थर और बाक्साइट छत्तीसगढ़ में शक्ति के संसाधन।

**इकाई–3** कृषि– प्रमुख खाद्यान्न फसलें, दलहन एवं अन्य फसलें, जनसंख्या– वृद्धि, वितरण और घनत्व, जनजातिय जनसंख्या । ग्रामीण और नगरीय जनसंख्या ।

**इकाई–4** उद्योग, लौह इस्पात उद्योग, सिमेंट चीनी, एल्युमिनीयम, छत्तीसगढ़ के औद्योगिक प्रदेश।

**इकाई–5** व्यापार, परिवहन, पर्यटन, छत्तीगढ़ का सामाजिक आर्थिक विकास ।

**BOOKS RECOMMENDED:**


1. Jha, Vibhash Kumar and Saumya Naiyyar (2013) Chhattisgarh Samagra, Chhattisgarh Rajya Hindi Granth Academic, Raipur
2. Kumar, Pramila (2003): Chhattisgarh Ek Bhaugolik Addhyayan. Madhya Pradesh Hindi Granth Academic, Bhopal
3. Nagesh Jitendra and at all (2014): Chhattisgarh Sandarbh 2014 Jansanmpark Vibhag, C.G. Govt., Raipur
4. Tiwari, Vijay Kumar ( ): Geography of Chhattisgarh, Himalaya Publishing House, Pvt. Ltd
5. Tripathi, Kaushlendra and Pursottam Chandrakar (2001): Geography of Chhattisgarh, Sharda prakashan, Aazad Nagar , Bilaspur.
6. Verma ,L.N. (2017): Geography of Chhattisgarh, Madhya Pradesh Hindi Granth Academic, Bhopal

बी.ए./बी.एस.सी. – तृतीय वर्ष
भूगोल
प्रश्न पत्र–तृतीय
प्रायोगिक भूगोल

अधिकतम अंक : 50

**खण्ड (अ)** **मनचित्र पठन एवं निर्वचन** 20

**इकाई–1** बैन्ड ग्राफ, हीदर ग्राफ, क्लाइमोग्राफ, पवनारेख ।

**इकाई–2** भारतीय स्थलाकृतिक मानचित्र की व्याख्या प्रकार, वर्गीकरण धरतलीय मानचित्र के प्रकार एवं विश्लेषण, राष्ट्रीय एवं अन्तराष्ट्रीय, भौतिक एवं सांस्कृतिक तत्वों के आधार पर विश्लेषण ।

**इकाई–3** उपग्रह बिम्ब : प्रारम्भिक सूचनाओं की व्याख्या बिम्ब निर्वाचन : चाक्षुश विधि – भूमि उपयोग भूमि आच्छादन मानचित्रण, जी0 पी0 एस0 का उपयोग एवं अनुप्रयोग ।

**खण्ड (ब)** **सर्वेक्षण एवं क्षेत्रीय प्रतिवेदन** 20

**इकाई–4** सर्वेक्षण , समपटल सर्वेक्षण, प्रतिच्छेदन एवं स्थिति निर्धारण ।

**इकाई–5** भूगोल में क्षेत्रीय कार्य का महत्व किसी छोटे क्षेत्र का भौतिक सामाजिक आर्थिक सर्वेक्षण और रिपोर्ट तैयार करना ।

**प्रायोगिक पुस्तिका और मौखिक परिक्षण परीक्षा** 10

**Books Recommended:**


1. Archer, J.E. and Dalton, T.H. (1968): Field Work in Geography. William Clowes and Sons Ltd. London and Beccles.
2. Bolton, T. and Newbury, P.A. (1968): Geography through Fieldwork. Brandford Press, London.
3. Campell, J. B. (2003): Introduction to Remote Sensing. 4th edition. Taylor and Francis, London.
4. Chanel, D. D. (2004): Remote Sensing and Geographical Information System(in Hindi), Sharda Pustak Bhawan, Allahabad
5. Cracknel, A. and Ladson, H. (1990): Remote Sensing Year Book. Taylor and Francis, London.
6. Curran, P.J. (1985): Principles of Remote Sensing. Longman, London.
7. Davis, R.E. and Foote, F.S. (1953): Surveying, 4th edition, McGraw Hill Publication, New York
8. Deekshatulu, B.L. and Rajan, Y.S. (ed.) (1984): Remote Sensing. Indian Academy of Science, Bangalore.
9. Floyd, F. and Sabins, Jr. (1986): Remote Sensing: Principles and Interpretation. W.H. Freeman, New York.
10. Gautam, N.C. and Radhaswamy, V. (2004). Land Use/ Land Cover and Management Practices in India. B.S. Publication., Hyderabad.
11. Jensen, J.R. (2004): Remote Sensing of the Environment: An Earth Resource Perspective. Prentice-Hall, Englewood Cliffs, New Jersey. Indian reprint available.
12. Jones, P.A.(1968): Fieldwork in Geography, Longmans, Green and Company Ltd., First Publication, London

13. Kanetker, T.P. and Kulkarni, S.V.(1967): Surveying and Levelling, Vol I and II V.G. Prakashan, Poona.
14. Lille sand, T.M. and Kiefer, R.W. (2000): Remote Sensing and Image Interpretation. John Wiley and Sons, New York.
15. Monk house, F. J. (1985): Maps and Diagrams. Methuen, London.
16. Nag, P. (ed.) (1992): Thematic Cartography and Remote Sensing. Concept Publishing Company, New Delhi.
17. Natrajan, V. (1976): Advanced Surveying, B.I. Publications., Mumbai.
18. Rampal, K.K. (1999): Handbook of Aerial Photography and Interpretation. Concept Publishing. Company, New Delhi.
19. Raisz, E. (1962): Principles of Cartography, McGraw Hill, New York.
20. Robinson, A. H., Sale. R. D., Morrison, J. L. and Muehrcke, P. C. (1984): Elements of Cartography. 5th edition, John Wiley and Sons, Inc. New York.
21. Sarkar, A. K. (1997): Practical Geography: A Systematic Approach. Orient Longman, Kolkata
22. Sharma, J. P. (2001): Prayogik Bhugol., Rastogi Publication, Meerut 3rd. edition.
23. Singh, R.L. and Singh Rana P.B. (1993): Elements of Practical Geography. (Hindi and English editions). Kalyani Publishers, New Delhi.
24. Stoddard, Robert H. (1982): Field Techniques and Research Methods in Geography. Kendall/Hunt Pub. Dubuque IO.

# B. Sc. Part III

## ELECTRONICS

## Paper I

### ELB 301: Industrial Electronics

**Theory:** **Max. Marks: 50**

### Unit-1

**Thyristors:** Principles and operations of SCR, voltage amplifier gate characteristics of SCR, characteristics of two transistor models, Thyristor construction, rectifier circuit using SCR, GTO, Operation and characteristics of DIAC, TRIAC, Silicon Controlled Switch, Silicon Unilateral Switch, Silicon Bilateral Switch and Light activated SCR. Turn ON/OFF Mechanism: Basics of turn on and turn off methods.

### Unit-2

**Applications of SCR**: Multiple connections of SCR, Series operation, Triggering of series connected SCR, Parallel operation, Triggering of parallel connected SCR, SCR di/dt calculation, Snubber circuit, dv/dt calculation across SCR, Types of converters, Full wave controlled rectifier with resistive load, FWCR with inductive load, FWCR with freewheeling diode .

### Unit-3

**Inverters:** Types of inverters, Single phase bridge inverter, Mc Murray impulse communication inverter, Single phase half bridge voltage source inverter, Single phase full bridge voltage inverter, Step down choppers, Step up choppers, Chopper classification.

**Other Applications:** Induction heating, Resistance welding, Over voltage protection, Zero voltage switch, SMPS,UPS, DC circuit breaker, Battery charger, AC static switch, DC static switch, Time delay, Fan regulator using TRIAC .

### Unit-4

**PCB Fundamentals:** PCB Advantages, components of PCB, Electronic components, IC's, Surface Mount Devices (SMD). Classification of PCB - single, double, multilayer and flexible boards, Manufacturing of PCB, PCB standards.

**Schematic & Layout Design:** Schematic diagram, General, Mechanical and Electrical design considerations, Placing and Mounting of components, Conductor spacing, routing guidelines, heat sinks and package density, Net list, creating components for library, Tracks, Pads, Vias, power plane, grounding, Lead cutting and Soldering Techniques, Testing and quality controls. PCB Technology Trends, Environmental concerns in PCB industry.

## Unit-5

**Analog/Digital Multimeter :** Analog multimeter, AC and DC measurment, conversion of analog output to digital form (A/D), Dual ramp A/D converter, digital measuring system, multimeter block diagram, voltage, current and resistance measurments. Frequency counter: Elements of electronic counter, decade counting assembly temperature compensated prystal oscillator, universal counter, measurement modes; frequency measurement, period measurement, time interval measurement, measurement errors: gating errors, time base error, trigger level error.

**Suggested Books:**


1. Ramamourthy " Thyristor and their applications" East-West Publishers, 2nd Edition
2. Shamir K Datta " Power Electronics and Controllers" PHI, 3rd Edition
3. Power Electronics: Devices, Circuits and Industrial Applications
4. V.R. MoorthyOxford University Press; First Edition edition
5. Printed circuit Board – Design & Technology by Walter C. Bosshart, Tata McGraw Hill.
6. Printed Circuit Board –Design, Fabrication, Assembly & Testing by R.S.Khandpur, TATA McGraw Hill Publisher
7. Electronics Instrumentation H.S.Kalsi McGraw Hill Education; 3 edition (1 July 2017)
8. Modern Electronic Instrumentation and Measurement Techniques Albert Helfrick and William D Cooper Prentice Hall India Learning Private Limited
9. Electronic Instrumentation and Measurements David A. Bell Oxford University Press India; Third edition (12 April 2013)

# Paper II

## ELB 302: Mobile Application Programming and Introduction to VHDL

**Theory:** **Max. Marks: 50**

### Unit-1

**Introduction:** What is mobile Application Programming, different Platforms, architecture and working of Android, iOS and Windows phone 8 operating system, comparison of Android, iOS and Windows phone 8.

**Android Development Environment:** What is Android, Advantages and Future of Android, Tools and about Android SDK, Installing Java, Eclipse, and Android, Android Software Development Kit for Eclipse, Android Development Tool: Android Tools for Eclipse, AVDs: Smartphone Emulators, Image Editing,

### Unit-2

**Android Software Development Platform:** Understanding Java SE and the Dalvik Virtual Machine, directory Structure of an Android Project, common Default Resources Folders, the Values Folder, Leveraging Android XML, Screen Sizes, Launching your application: The AndroidManifest.xml File, Creating your First Android Application

**Android Framework Overview:** The Foundation of OOP, the APK File, Android Application Components, Android Activities: Defining the User Interface, Android Services: Processing in the Background, Broadcast Receivers: Announcements and Notifications, Content Providers: Data Management, Android Intent Objects: Messaging for Components, Android Manifest XML: Declaring Your Components

### Unit-3

**Views and Layouts, Buttons, Menus, and Dialogs, Graphics Resources in Android:** Introducing the Drawables, Implementing Images, Core Drawable Subclasses, Using Bitmap, PNG, JPEG and GIF Images in Android, Creating Animation in Android

**Handling User Interface (UI) Events:** An Overview of UI Events in Android, Listening for and Handling Events, Handling UI Events via the View Class, Event Callback Methods, Handling Click Events, Touchscreen events, Keyboard Events, Context Menus, Controlling the Focus,

### Unit-4

**Content Providers:** An Overview of Android Content Providers, Defining a Content Provider, Working with a Database

**Intents and Intent Filters:** What is an Intent, Implicit Intents and Explicit Intents, Intents with Activities, Intents with Broadcast Receivers **Advanced Android,** and New Features in Android 4.4.

**iOS Development Environment:** Overview of iOS, iOS Layers, Introduction to iOS application development.

**Windows phone Environment:** Overview of windows phone and its platform, Building windows phone application.

## Unit-5

**Introduction to VHDL:** Structure of HDL Module, Comparison of VHDL and Verilog, Introduction to Simulation and Synthesis Tools, Test Benches. VHDL Modules, Delays, data flow style, behavioral style, structural style, mixed design style, simulating design. Introduction to Language Elements, Keywords, Identifiers, White Space Characters, Comments, format. VHDL terms, describing hardware in VHDL, entity, architectures, concurrent signal assignment, event scheduling, statement concurrency, structural designs, sequential behavior, process statements, process execution, sequential statements, architecture selection, configuration statements

**Suggested Books:**


1. Beginning Android 4, OnurCinar , Apress Publication
2. Professional Android 4 Application Development, Reto Meier, Wrox
3. Beginning iOS 6 Development: Exploring the iOS SDK, David Mark, Apress
4. Beginning Windows 8 Application Development, IstvánNovák, ZoltanArvai, GyörgyBalássy and David Fulop
5. Professional Windows 8 Programming: Application Development with C# and XML,Allen Sanders and Kevin Ashley, WroxPublication
6. Programming with Mobile Applications: Android, iOS, and Windows Phone 7 ,Thomas Duffy, Course Technology, Cengage Learning 2013
7. A VHDL Primer – J. Bhasker, Prentice Hall, 1999, III Edition. Verilog HDL-A guide to digital design and synthesis-Samir Palnitkar, Pearson, 2nd edition.

# ELECTRONICS LABORATORY

*The scheme of practical examination will be as follows-*

| | | |
|---|---|---|
| **Experiment** | -- | **30** |
| **Viva** | -- | **10** |
| **Sessional** | -- | **10** |
| **Total** | -- | **50** |

**ELB 303P: INDUSTRIAL ELECTRONICS & PCB Design LAB** **MM-25**
**(Hardware and Circuit Simulation Software)**
**Max.Marks:25**

1. Study of I-V characteristics of DIAC
2. Study of I-V characteristics of a TRIAC
3. Study of I-V characteristics of a SCR
4. SCR as a half wave and full wave rectifiers with R and RL loads
5. DC motor control using SCR.
6. DC motor control using TRIAC.
7. AC voltage controller using TRIAC with UJT triggering.
8. Study of parallel and bridge inverter.
9. Design of snubber circuit
10. Study of chopper circuits

## Design and Fabrication of Printed Circuit Boards

1. Design automation, Design Rule Checking; Exporting Drill and Gerber Files; Drills; Footprints and Libraries Adding and Editing Pins, copper clad laminates materials of copper clad laminates, properties of laminates (electrical & physical),
2. Study of soldering techniques. Film master preparation, Image transfer, photo printing, Screen Printing, Plating techniques etching techniques,
3. Study of Mechanical Machining operations, Lead cutting and Soldering Techniques, Testing and quality controls.
4. Study of Lead cutting and Soldering Techniques, Testing and quality controls.

**Suggested Books:**

1. Printed circuit Board – Design & Technology by Walter C. Bosshart, Tata McGraw Hill.

2. Printed Circuit Board –Design, Fabrication, Assembly & Testing by R.S.Khandpur, TATA McGraw Hill Publisher

## ELB 304 P: Mobile Application & VHDL Lab M.M. - 25

**Mobile communication Lab**

1. Develop an application that uses GUI components, Font and Colors.
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. Develop an application that makes use of RSS Feed.
7. Implement an application that implements Multi-threading.
8. Develop a native application that uses GPS location information.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Write a mobile application that creates alarm clock.

**Introduction to VHDL**

12. Write the VHDL Code & Simulate it for the following gates.
    a. Two I/P AND Gates.
    b. Two I/P OR Gates.
    c. Two I/P NAND Gates
    d. Two I/P NOR Gates.
    e. Two I/P Ex-OR Gates.
    f. NOT Gates
13. Write VHDL programs for the following circuits, check the wave forms and the hardware generated

    a. Half adder b. Full adder

**B.Sc. Part - III**
**FORESTRY**
**PAPER – I**

**Maximum Marks 50**

**UNIT – 1:- FOREST ECOLOGY**

(1) Basic Ecological Principles and Concepts.
(2) Abiotic and Biotic components of Forest Ecosystem
(3) Fundamental concepts related to energy in Ecological system, food chain, Food web and Trophic structure.
(4) Ecological Pyramids.
(5) Biotic Community Concept.

**UNIT – II – WILDLIFE MANAGEMENT**

(1) Wildlife Conservation and Management
(2) National Parks and Sanctuaries
(3) Project Tiger
(4) Vanishing Species

**UNIT - III - WILDLIFE PROTECTION ACT**

(1) General idea of Wildlife Protection Act, 1972

**UNIT – IV- FOREST POLICIES**

(1) Brief idea of Forest Policies of – 1894, 1952, 1988
(2) Need for new policy

**UNIT – V- FOREST LAW**

(1) Brief Knowledge of Indian Forest Act, 1927
(2) Forest Conservation Act, 1980

**B.Sc. Part - III**
**FORESTRY**
**PAPER – II**

**Maximum Marks 50**

**UNIT – I : FOREST SOILS**

(1) Definition and Function of Soil
(2) Importance of Soil
(3) Soil Formation
(4) Soil Properties
(5) Soil Pollution

**UNIT – II- FOREST PATHOLOGY**

(1) Definition, Kinds of Symptoms of diseases, methods of control
(2) Root diseases and their control
(3) Heart Root
(4) Nursery Diseases
(5) Common Diseases in Selected Forest Trees

**UNIT – III- FOREST ENTOMOLOGY**

(1) Classification of class Inseta with distinguishing characters
(2) Pests of Important Forest Trees and their control
(3) Pests of Nurseries

**UNIT –IV- FOREST PROTECTION**

(1) Introduction
(2) Factors affecting forest protection and kinds of forest protection measures
(3) Protection of forest from Injuries by – Man, Animals, Plants, Adverse climatic factors

**UNIT – V- FOREST ENGINEERING**

(1) Building Materials
(2) Building Construction
(3) Forest Roads
(4) Forest Bridges

**B.Sc. Part - III**
**FORESTRY**
**PAPER – III**

**Maximum Marks 50**

## LIST OF PRACTICALS

1. Ecology – Quadrates for density, abundance and frequency
2. Study of components of forest ecosystem
3. Visit to National park or Wildlife Sanctuary
4. Study of Soils
5. Soil pH

**Reference Books**


| | | |
|---|---|---|
| 1. Forest Entomology | - | B.K. Bakshi |
| 2. Ecology and Environ. Science | - | Rastogi Publication |
| 3. Wildlife Management | - | S.S. Negi / L.S. Khanna |
| 4. Indian Forest Act | - | Manual |
| 5. Forest Laws and Policies | - | Manual |
| 6. Soil Science | - | D.K. Das / Vinay Kumar / Backman & Brady |
| 7. Forest Pathology | - | R.S.Singh |
| 8. Forest Engineering | - | L.S. Khanna |
| 9. Roads ,Bridges | - | L.S. Khanna |
| 10.Fundamental of Ecology | - | E.P. Odum |


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