Syllabus of Biotechnology

(B. Sc. I, II & III Year)

Session

2018-2019
2019-2020
2020-2021

B.Sc.-I

BIOTECHNOLOGY

PAPER – I

BIOCHEMISTRY, BIOSTASTICS AND COMPUTERS

UNIT-I

1. Introduction to Biochemistry: History, Scope and Development.

2. Carbohydrates: Classification, Structure and Function of Mono, Oligo and Polysaccharides.

3. Lipids: Structure, Classification and Function.

UNIT –II

1. Amino acids and Proteins: Classification, Structure and Properties of amino acids, Types of Proteins and their Classification and Function.

2. Enzymes: Nomenclature and Classification of enzyme, Mechanism of enzyme action, Enzyme Kinetics and Factors affecting the enzymes action. Immobilization of enzyme and their application.

UNIT –III

1. Hormones: Plant Hormone-Auxin and Gibberellins and Animal Hormone-Pancreas and Thyroid.

2. Carbohydrates, Proteins and Lipid Metabolism - Glycolysis, Glycogenesis, Glyconeogenesis, Glycogenolysis and Krebs cycle. Electron Transport Chain and β-oxidation of Fatty acids.

UNIT-IV

1. Scope of Biostatistics, Samples and Population concept, Collection of data-sampling techniques, Processing and Presentation of data.

2. Measures of Central Tendency: Mean, Median and Mode and Standard Deviation.

3. Probability Calculation: Definition of probability, Theorem on total and compound probability.

UNIT-V

1. Computers - General introduction, Organization of computer, Digital and Analogue Computers and Computer Algorithm.

2. Concept of Hardware and Software, Input and Output Devices.

3. Application of computer in co-ordination of solute concentration, pH and Temperature etc., of a Fermenter in operation and Internet application.

BoS approved syllabus for B.Sc. Biotechnology (Academic session 2018-19, 2019-20 and 2020-21)

List of Books

1. Nelson and Cox (2005) Principles of Biochemistry, Fourth Edition
2. Todd and Howards Mason (2004) Text book of Biochemistry, Fourth Edition
3. Lubert Stryer and Berg ((2004) Biochemistry, Fifth Edition
4. Diana Rain, Marni Ayers Barby - (2006) Textbook on Q level Programming. 4th Edition.
5. Karl Schwartz: (2006) Guide of Micro Soft. Marina Raod, 4th Edition.
6. E Balaguruswamy by Programming in BASIC (1991).
7. RC Campbell by Statistics for Biologists. .
8. P Cassel et al by Inside Microsoft Office,
9. Statistical Methods, GW Snedecor and WG Cochran.
10. AC Wardlaw by Practical Statistics for Experimental Biologists,
11. JHZar by Bio-statistical analysis
12. RR Sokal FJ Rohlf by Introduction to Biostatistics
13. L Y Kun (2003) Microbial Biotechnology: Principles and applications
14. Khan and Khanum (1994) Fundamental of Biostastics

B.Sc.-I

BIOTECHNOLOGY

PAPER–II
CELL BIOLOGY, GENETICS AND MICROBIOLOGY

UNIT-I

1. Concept of life, Cell as a basic unit of living system and Cell theory.
2. Diversity of Cell shape and size.
3. Prokaryotic cell structure: Function and ultra structure of cell (Gram positive and Gram negative Bacteria), Plasma membrane, Flagella, Pilli, Endospore and Capsule.
4. Eukaryotic cell: Plant cell wall and Plasma membrane.

UNIT-II

1. Cytoplasm: Structure and Functions of Endoplasmic reticulum, Ribosome, Golgi complex, Lysosomes, Nucleus, Mitochondria and Chloroplast.
2. Cytoskeleton: Microtubules, Microfilaments and Intermediate filaments.
3. Cell division: Mitosis and Meiosis.
4. Programmed Cell Death.

UNIT-III

1. Mendel's Laws of Inheritance.
2. Linkage and Crossing over.
3. Chromosome variation in number and structure: Deletion, Duplication, Translocation, Inversion and Aneuploidy, Euploidy (Monoploidy and Polyploidy and its importance).

UNIT-IV

1. History, Scope and Development of Microbiology.
2. Basic techniques of Microbial Culture
3. Microbial Growth & Nutrition of Bacteria: Isolation, media sterilization- physical and chemical agents, pure culture-pour plate method, streak plate method and spread plate method.
4. General features and Economic importance of Fungi, Algae and Protozoa etc.

UNIT-V

1. Bacterial Reproduction: Conjugation, Transduction and Transformation.
2. Mycoplasma – History, Classification, Structure reproduction & Diseases.
3. Viruses – Basic features, Structure, Classification, Multiplication, Bacteriophages (Morphology, life cycle, infection and medicinal importance)

List of Books

1. C.B. Power- Cell biology, First Edition (2005), Himalaya Publishing House.
2. Gereld Karp - Dell and molecular biology, 4th Edition (2005)
3. P.K. Gupta - Cell and molecular biology, Second Edition (2003), Restogi publications.
4. C.B., Oowar - Cell biology, Third Edition (2005) Himalaya Publishing Hosue.
5. S.S. Purohit - Microbiology : Fundamentals and Applications, 6th Edition (2004)
6. R.C. Dubey and D.K. Maheshwari: Practical Microbiology. S.Chand Publication.
7. R.C. Dubey and D.K. Maheshwari,Microbiology (2006). S.Chand Publication.
8. Tortora, Funke and Case - Microbiology, An introduction, sixth Edition (1995), Benjamin/Cummings Publishing Company.
9. Prescott, Harlyey and Klein - Microbiology, Third Edition, Wm. C. Brown Publishers (1996).
10. P. Chakraoborthy - Textbook of microbiology, Second Edition (2007).
11. Prescott, Harley and Klein - Microbiology. Third Edition. Wm. C. Brown.
12. Microbial Genetics, David Freifelder, John F Cronan, Stanley R Maloy, Jones and Bartlett Publishers.
13. Elements of Human Genetics. I.I. cavalla-Sfoeza, WA Benjamin Advanced Book Program.
14. S.K Jadhav and P.K. Mahish (2018) Prayogtmak Jaivprodyogiki awam Sukshmjivigyan- Chhattisgarh Hindi Granth Academy, Raipur.

MICROBIOLOGY AND BIOCHEMICAL TECHNIQUES

(1) Laboratory rules, Tools, Equipment and Other requirements in Microbiological laboratory.

(2) Micrometry – Use of ocular & stage Micrometrer.

(3) Counting of bacteria by counting chamber, by plate count.

(4)Preparation of media and cultivation techniques:
    (a) Basic liquid media (broth)
    (b) Basic Solid media, (agar slants and deep tubes)
    (c) Demonstration of selective and differential media
    (d) Isolation and enumeration of micro organisms
    (e) Isolation from air and Soil

(5)Smears and staining methods:
    (a) Preparation of bacterial smear
    (b) Gram Negative & Positive staining

(6)Methods of obtaining pure cultures
    (a) Streak plate method
    (b) Pure plate method
    (c) Spread plate method
    (d) Broth cultures

(7)Growth & Biochemical techniques
    (a) Determination of bacterial growth curve
    (b) Amylase production test
    (c) Cellulose production test
    (d) Estimation of Sugar in given solution
    (e) Extraction and separation of lipids
    (f) Estimation of proteins
    (h) Mitosis and Meiosis

(8)Biostatistics:
    (a) By Manual and by computer.
    (b) Problems on mean, mode and median.

BoS approved syllabus for B.Sc. Biotechnology (Academic session 2018-19, 2019-20 and 2020-21)

SCHEME OF PRACTICAL EXAMINATION

Time – 4 hrs.   **M. M.: 50**

1. Experiment based on culture of micro-organisms   15 Marks
2. Bacterial growth/Staining techniques   10 Marks
3. Biochemical techniques   05 Marks
4. Bio statistics   05 Marks
5. Spotting   05 Marks
6. *Viva – Voce*   05 Marks
7. Record/Sessional   05 Marks

B.Sc. II
BIOTECHNOLOGY

PAPER – I

MOLECULAR BIOLOGY & BIOPHYSICS
M.M. 50

UNIT-I

1. Nucleic Acid: Bases, Nucleosides and Nucleotides, DNA and RNA structure.
2. Plasmids.
3. Transposons: Repetitive elements, LINEs & SINEs, Structure of Gene.

UNIT-II

1. DNA Replication: Enzymes involved and mechanism of DNA Replication in Prokaryotes.
2. Mutation: Molecular level of Mutation, Types of Mutagens, Spontaneous and Induced Mutation.
3. DNA Repair: NER, BER and Mismatch Repair.

UNIT-III

1. Genetic Code: Features, Condon Assignment and Wobble hypothesis.
2. Transcription: Initiation, Elongation and Termination in Prokaryotes.
3. Translation: Initiation, Elongation and Termination Translation machinery in Prokaryotes. Operon-Concept of Operator, Regulator, Promoter gene, Inducer and Co-repressor.

UNIT –IV

1. Biophysics : Introduction, Scope and Application
2. Principle, Structure, Functions of the following:
   a. Microscopy b. Colorimeter and Spectroscopy c. Electrophoresis
   d. Centrifugation e. Chromatography.

UNIT –V

1. Radioisotopes techniques: Measurement of radioactivity, Ionization Chambers, Geiger Muller and Scintillation Counter.
2. Autoradiography and DNA Fingerprinting.
3. Biosensor.

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List of Books

1. Gerald Karp - Cell and Molecular biology, 4th Edition (2005).
2. Lewis J.Klein Smith and Valerie M.Kish-Principles of cell and molecular biology-Third
3. Edition (2002)
4. P.K. Gupta- Cell and molecular biology, Second Edition (2003), Rastogi publications.
5. Richard M-Twyaman-Advanced Molecular Biology, First South Asian Edition (1998), VivaBooks Pvt. Ltd.
6. K. Wilson and J.Walker (2012) Principle and Techniques of Biotechnology and MolecularBiotechnology.
7. Upadhya and Upadhya : Biophysical Chemistry.
8. David, I. Nelson and Michael M.Cox :Lehniger : Principal of Biochemistry 4th Edition. W.H. Freeman and Company, New York.
9. Buchanan, Gruissemen& Jones (2015) Biochemistry & Molecular Biology of Plant, 2nd edition.

B.Sc. II
BIOTECHNOLOGY

PAPER II

RECOMBINANT DNA TECHNOLOGYAND GENOMICS

M.M. 50

UNIT-I

1. Recombinant DNA technology: General concept. Steps in gene cloning and application.
2. Host controlled Restriction Modification System, Ligases and Polymerases, Klenow fragment, Taq, Pfu polymerase and Nuclease (Endo, Exo and restriction endonuclease).
3. Modification Enzyme (Kinase, Phosphates and terminal deoxynucleotidyl transferase). Reverse Transcriptase.

UNIT –II

1. Vectors: Plasmid, Bacteriophages, Cosmid, SV40 and Expression vectors.
2. Gene Library: Genomic and cDNA library.
3. Selection and Screening of Recombinants: Genetic and Hybridization methods.

UNIT –III

1. PCR: Types of PCR, Steps (Denaturation, Annealing and Extension); Applications, Advantages and Limitation of PCR.
2. Molecular Marker-RFLP, RAPD and Micro array.
3. Human Genome Project.

UNIT-IV

1. Basic concept of Gene Transfer Methods: Microinjection, Electroporation, Lipofection and Microprojectile.
2. Gene Therapy: *In vivo* and *Ex vivo*, Germ line and Somatic gene therapy.
3. Basic idea of Stem cell technology: Types of stems cell cultures and their Significance.

UNIT-V

1. Introduction to Bioinformatics: History, Objective and Application.
2. Major Bioinformatics Resource – NCBI , Types of Databases (Primary and Secondary Databases) , BLAST and FASTA
3. Basic concept of Genomics and Proteomics

List of Books

1. B.D. Singh (2004) Biotechnology, Expanding Horizons. First Edition. Kalyani Publishers, Ludhiana.

2. P.K. Gupta (2005) Biotechnology and Genomics, Rastogi Publication, Meerut.

3. Stan bury and Whittaker - Principles of Sterilization techniques, First Indian reprint Edition (1997). Aditya Book (P) Ltd. New Delhi.

4. L.E. Casida (1994)Industrial Microbiology Edition .

5. A.H. Patel (2003) Industrial Microbiology 4th Edition.

6. K.S. Bilgrami and A.K. Pandey(1998) Introduction to Biotechnology Edition 2nd (1998)

7. U Satyanarayan (2005) Biotechnology, First Edition Books and Allied (P) Ltd. Kolkata.

8. Atul kumar and VandanaA.Kumar (2004) Plant Biotechnology and tissue culture, Principle and Perspectives, International Books Distributing Co. Lucknow.

10. S Choudhuri, and DB Carlson (2008) Genomics: Fundamentals and applications, 1st edition.

11. TK Attwood and DJ Parry (2009) Introduction of Bioinformatics.

12. Philip E Bourne Helge Whisking (2003) Structural Bioinformatics.

13. Des Higgins and Willie Taylor (2000) Bioinformatics Sequence, Structure and Databanks.

List of Practical's

MOLECULAR BIOLOGY, BIOPHYSICS, RECOMBINANT DNA TECHNOLOGY AND GENOMICS

1. Isolation of DNA from Plant cell.
2. Estimation of DNA by DPA method.
3. Isolation RNA from yeast cells

Experiment based on-
4. Centrifugation
5. Spectrophotometer/Colorimeter
6. Electrophoresis
7. Paper chromatography/TLC

Experiment based on Bioinformatics -
8. Retrieve DNA /Protein sequence from Biological Data Bases (NCBI).
9. Use of tools studied

SCHEME FOR PRACTICAL EXAMINATION

Time: 4 hrs. M.M.: 50

1. Experiment based on DNA/RNA	10 marks
2. Experiment based on Instruments	10 marks
3. Experiment based on Bioinformatics	10 marks
4. Spotting	10 marks
5. *Viva - Voce*	05 marks
6. Record / Sessional	05 marks

B.Sc. 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.

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B.Sc. 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

<h1 align="center">List of Practical's</h1>

<h2 align="center">PLANT, ENVIRONMENTAL, INDUSTRIAL AND MEDICAL BIOTECHNOLOGY</h2>

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

    (i) Plant tissue culture   08 marks

    (ii) Environment / Industrial   07marks

2. Experiment based on Paper - II   15 marks

3. Spots   10marks

4. *Viva-voce*   05marks

5. Sessional/ Record   05marks

BoS approved syllabus for B.Sc. Biotechnology (Academic session 2018-19, 2019-20 and 2020-21)

SYLLABUS
GEOGRAPHY
(B.A. / B.Sc.)
(UG COURSES)
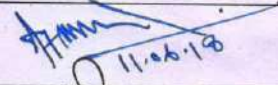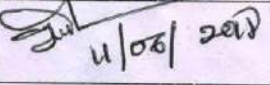
Admitted Batch 2018-19
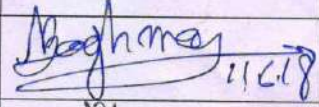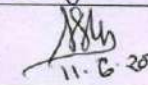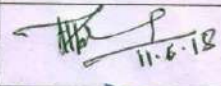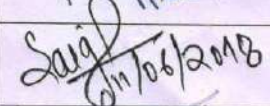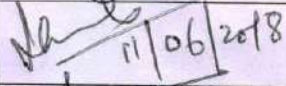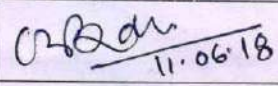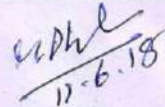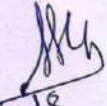
JUNE 2018

Chhattisgarh State Council of Higher Education

उपस्थिति पत्रक
केन्द्रीय अध्ययन मण्डल की बैठक

अध्ययन शाला का नाम – भूगोल अध्ययन शाला, पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर

बैठक दिनांक –   11 / 06 / 2018   समय – 11:00 बजे

क्रमांक	सदस्यों का नाम / पदनाम	हस्ताक्षर
1	डॉ. एन. के. बघमार, प्रोफेसर अध्यक्ष, भूगोल, अध्ययन मण्डल, पं. र. वि. वि. रायपुर	Baghmar 11.6.18
2	डॉ. सरला शर्मा, प्रोफेसर एवं अध्यक्ष भूगोल अध्ययन, शाला, पं. र. वि. वि. रायपुर	11. 6. 2018
3	डॉ. अमृत लाल पटेल, प्रभारी प्राचार्य, (पदोन्नत प्राध्यापक) शासकीय महाविद्यालय, सरायपाली	11.6.18
4	डॉ. डी. एल. पटेल, सहा. प्राध्यापक अध्यक्ष, भूगोल, अध्ययन मण्डल, बस्तर वि. वि., जगदलपुर	11.06.18
5	श्री गोपीश्वर साय, सहा. प्राध्यापक अध्यक्ष, भूगोल, अध्ययन मण्डल, सरगुजा वि.वि. अम्बिकापुर	Saig 11/06/2018
6	डॉ. शीला श्रीधर, सहा. प्राध्यापक एवं विभागाध्यक्ष, भूगोल विभाग, शास. दू. ब. महिला. महा. रायपुर	11/06/2018
7	डॉ. कृष्ण कुमार द्विवेदी, सहा. प्राध्यापक, एवं विभागाध्यक्ष, भूगोल विभाग, शास. के. डी. महिला महा., राजनांदगांव	11/06/2018
8	श्री एम. एस. साहू, सहा. प्राध्यापक एवं विभागाध्यक्ष, भूगोल विभाग, शास. स्नातकोत्तर महा. कुरूद, धमतरी	11.06.18
9	डॉ. सखा राम कुजाम, सहा. प्राध्यापक शास. महा. नारायणपुर	
10	डॉ. एम. पी. गुप्ता, प्रोफेसर एवं पूर्व अध्यक्ष, भूगोल अध्ययन, शाला, पं. र. वि. वि. रायपुर, विशेष आमंत्रित सदस्य,	11.6.18

11.6.18
अध्यक्ष
भूगोल अध्ययन शाला
पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर

केन्द्रीय अध्ययन मण्डल की बैठक
दिनांक 11 / 06 / 2018

कार्यालय, आयुक्त उच्च शिक्षा के पत्र क्रमांक / 1686 / 315 / आउशि / समन्वय / 2018, रायपुर, दिनांक 05.06.2018 के द्वारा स्नातक स्तर के एकीकृत पाठ्यक्रमों के विभिन्न विषयों के पुनर्निरीक्षण हेतु केन्द्रीय अध्ययन मण्डलों में उक्त अधिनियम की धारा–34(ए) की उपधारा–2, 3 एवं 4 के अंतर्गत आयुक्त, उच्च शिक्षा, छत्तीसगढ़ के नामांकित सदस्यों की केन्द्रीय अध्ययन मण्डल की बैठक आज दिनांक 11 / 06 / 2018 को पूर्वान्ह 11:00 बजे भूगोल अध्ययनशाला में आयोजित की गई जिसमें निम्नांकित सदस्य उपस्थित रहे :–

अधिनियम के अन्तर्गत प्रावधान	सदस्य का नाम	हस्ताक्षर
34(क)(2)(i) विश्वविद्यालय के उन विषय के अध्ययन मण्डल के अध्यक्ष	1. डॉ. एन. के. बघमार – अध्यक्ष, अध्ययन मण्डल, भूगोल, पं. रविशंकर शुक्ल वि.वि., रायपुर (छ.ग.) 2. डॉ. डी.एल. पटेल – अध्यक्ष, अध्ययन मण्डल, भूगोल, बस्तर विश्वविद्यालय, जगदलपुर (छ.ग.) 3. डॉ. गोपीश्वर साय – अध्यक्ष, अध्ययन मण्डल, भूगोल, सरगुजा विश्वविद्यालय, जगदलपुर (छ.ग.) 4. डॉ. सरला शर्मा, अध्यक्ष, भूगोल अध्ययनशाला, पं. रविशंकर शुक्ल वि.वि., रायपुर (छ.ग.)	
34(क)(2)(ii) कुलाधिपति द्वारा नामांकित महाविद्यालयों के स्नातकोत्तर स्तर के विभागाध्यक्ष	1. डॉ. शीला श्रीधर, सहा. प्राध्यापक एवं विभागाध्यक्ष, भूगोल, शा. स्नातकोत्तर दू. ब. महिला महाविद्यालय, रायपुर (छ.ग.)	
34(क)(3)(iii) कुलाधिपति द्वारा नामांकित महाविद्यालयों के स्नातक स्तर के विभागाध्यक्ष	1. डॉ. एम. एस. साहू, सहा. प्राध्यापक एवं विभागाध्यक्ष, शास. महाविद्यालय, कुरूद, धमतरी (छ.ग.) 2. डॉ. अमृत लाल पटेल, पदोन्नत प्राध्यापक एवं प्रभारी प्राचार्य, शासकीय महाविद्यालय, सरायपाली (छ.ग.) 3. डॉ. गोपीश्वर साय – अध्यक्ष, शासकीय महाविद्यालय, सुरजपर (छ.ग.) 4. डॉ. डी.एल.पटेल – विभागाध्यक्ष, भूगोल शास. भानुप्रतापदेव स्नातकोत्तर, महाविद्यालय, कांकेर (छ.ग.)	
34(क)(3)(iv) कुलाधिपति द्वारा आयुक्त उच्च शिक्षा की सिफारिश के आधार पर मनोनीत विषय विशेषज्ञ	1. श्री के. के. द्विवेदी सहा. प्राध्यापक शास. के. डी. महिला महाविद्यालय, राजनांदगांव	
34(क)(3)(v) आयुक्त उच्च शिक्षा का प्रतिनिधि		
विशेष आमंत्रित सदस्य	1. डॉ. एम. पी. गुप्ता, से.नि. प्राध्यापक, पं. रविशंकर शुक्ल वि.वि., रायपुर	

कार्य वृत :– आज दिनांक 11/06/2018 को पू.र्वान्ह 11:00 बजे केन्दीय अध्ययन मंडल, भूगोल की बैठक भूगोल अध्ययनशाला, पं. रविशंकर शुक्ल वि.वि., रायपुर में आयोजित हुई जिसमें निम्नानुसार अनुशंसा की गई :–

1. **कार्य सूची – 1** के संदर्भ में सदस्यों द्वारा बी.ए./बी. एस. सी – प्रथम, द्वितीय एवं तृतीय वर्ष, 2018–19 के पाठ्यक्रम के विषय में चर्चा की गई तथा बी.ए./बी. एस. सी – प्रथम, द्वितीय एवं तृतीय वर्ष, 2018–19 के पाठ्यक्रम में संशोधन कर निम्नलिखित संशोधित पाठ्यक्रम अनुशंसित किया गया –

Brief Summary
3 Year Integrated UG Courses (B.A./B.Sc) in Geography

B.A. /B.Sc. Part I

The B.A. /B.Sc. Part-I Examination in Geography will be 150 marks. There will be two theory papers and one Practical each of 50 marks as follows:

Paper - I   Physical Geography

Paper - II   Human Geography.

Paper - III   Practical Geography

B.A. /B.Sc. Part-II

The B.A./B.Sc. Part-II Examination in Geography will be 150 marks. There will be two theory papers and one Practical each of 50 marks as follows:

Paper-I   Economic and Resources Geography

Paper-II   Regional Geography of India

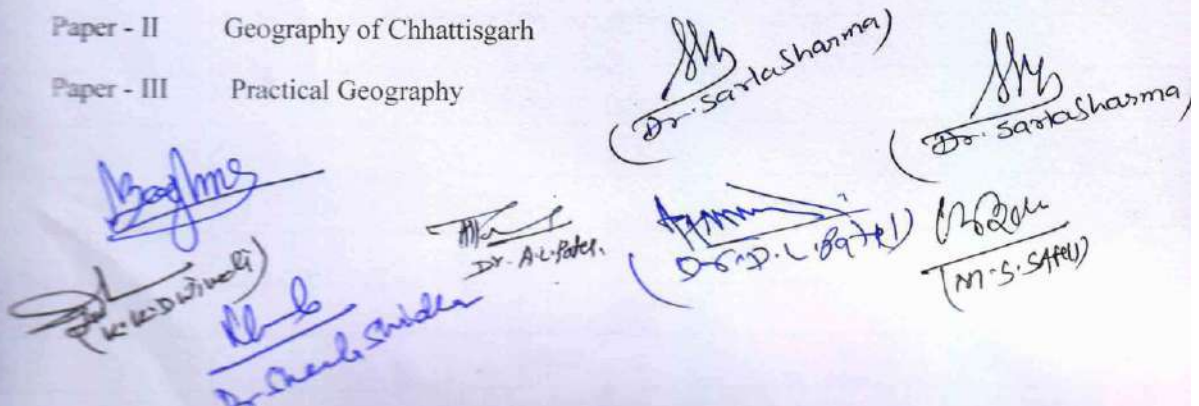Paper-III   Practical Geography

B.A. /B.Sc. Part III

The B.A. /B.Sc. Part III Examination in Geography will be 150 marks. There will be two theory papers and one Practical each of 50 marks as follows

Paper – I   Remote Sensing and GIS

Paper - II   Geography of Chhattisgarh

Paper - III   Practical Geography

प्रपत्र

कक्षा : बैचलर ऑफ आर्ट्स/साइंस
विषय : भूगोल
संकाय : कला/विज्ञान

प्रश्नपत्र	प्रश्नपत्र का नाम
I	भौतिक भूगोल (Physical Geography)
II	मानव भूगोल (Human Geography)
III	प्रायोगिक – मानचित्र एवं सांख्यिकी (Practical - Cartography and Statistical Techniques)
IV	आर्थिक एवं संसाधन भूगोल (Economic & Resource Geography)
V	भारत का प्रादेशिक भूगोल (Regional Geography of India)
VI	प्रायोगिक – मानचित्र निर्वचन, प्रक्षेप एवं सांख्यिकी विधि (Practical - Map Interpretation and Statistical Techniques) Projection
VII	सुदूर संवेदन एवं भौगोलिक सूचना प्रणाली (Remote Sensing and GIS
VIII	छत्तीसगढ़ का भूगोल (Geography of Chhattisgarh)
IX	प्रायोगिक – मानचित्र पठन एवं निर्वचन (Practical - Map Reading & Interpretation)

वर्तमान पाठ्यक्रम	नवीन संसोधित	नवीन संसोधित पाठ्यक्रम का औचित्य
संलग्नानुसार संलग्नक क्रमांक – 1	संलग्नानुसार संलग्नक क्रमांक – 2	1. विश्वविद्यालय अनुदान आयोग के पाठ्यक्रम के अनुरूप विषय वस्तु का युक्ति–युक्तकरण किया गया हैं । 2. छात्रों में विभिन्न प्रतियोगिता परीक्षा में सफलता के लिए नवीन पठन–पाठन शामिल कर प्रश्नपत्रों में संशोधन किया गया है । 3. छ. ग. शासन की अपेक्षाओं के अनुरूप, क्षेत्रीय आवश्यकताओं को ध्यान में रखकर पाठ्यक्रम तैयार किया गया है

1. डॉ. एन. के. बघमार,, अध्यक्ष : _Baghme_ Dr. H. K. BAGHMAR
2. डॉ. सरला शर्मा, प्रोफेसर, सदस्य : (Dr Sarla Sharma)
3. डॉ. अमृत लाल पटेल, सदस्य : Dr. A. L. Patel, Govt. college Saraipali
4. डॉ. डी. एल. पटेल, सदस्य : (Dr. D. L. Patel) Chairman board of Study Baster Vji
5. श्री गोपीश्वर साय, सदस्य :
6. डॉ. शीला श्रीधर, सदस्य : (Dr Sheela Shridhar)
7. डॉ. कृष्ण कुमार द्विवेदी, सदस्य : (Kusward)
8. श्री एम. एस. साहू, सदस्य : (M.S. SAHU) Govt. P.G. college Kusrud
9. डॉ. सखा राम कुजाम, सदस्य :
10. डॉ. एन. पी. गुप्ता, आमंत्रित सदस्य :

कार्य वृत :– आज दिनांक 11 / 06 / 2018 को पू र्वान्ह 11:00 बजे केन्दीय अध्ययन मंडल, भूगोल की बैठक भूगोल अध्ययनशाला, पं. रविशंकर शुक्ल वि.वि., रायपुर में आयोजित हुई जिसमें निम्नानुसार अनुशंसा की गई :–

1. **कार्य सूची – 1** के संदर्भ में सदस्यों द्वारा बी.ए. / बी. एस. सी – प्रथम, क्षितीय एवं तृतीय वर्ष, 2018–19 के पाठ्यक्रम के विषय में चर्चा की गई तथा बी.ए. / बी. एस. सी – प्रथम, क्षितीय एवं तृतीय वर्ष, 2018–19 के पाठ्यक्रम में संशोधन कर निम्नलिखित संशोधित पाठ्यक्रम अनुशंसित किया गया –

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Brief Summary
3 Year Integrated UG Courses (B.A./B.Sc) in Geography

</div>

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Paper - I	Physical Geography
Paper - II	Human Geography.
Paper - III	Practical Geography

B.A. /B.Sc. Part-II

The B.A./B.Sc. Part-II Examination in Geography will be 150 marks. There will be two theory papers and one Practical each of 50 marks as follows:

Paper-I	Economic and Resources Geography
Paper-II	Regional Geography of India
Paper-III	Practical Geography

B.A. /B.Sc. Part III

The B.A. /B.Sc. Part III Examination in Geography will be 150 marks. There will be two theory papers and one Practical each of 50 marks as follows

Paper – I	Remote Sensing and GIS
Paper - II	Geography of Chhattisgarh
Paper - III	Practical Geography

B.A. /B.Sc. Part I

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PAPER - I
PHYSICAL GEOGRAPHY
Max. Marks: 50
(Paper Code-0117)

</div>

Unit I　　　The Nature and Scope of Physical Geography. Origin of the Earth, Geological Time Scale, Earth's Interior, Continental Drift Theory (Wegner), Plate Tectonics, Isostasy.

Unit II　　　Earth movements: Earthquakes and Volcanoes. Rocks, Weathering, Erosion, and Normal cycle of erosion, Evaluation of landscapes- Fluvial, Arid, Glacial, Karts and Coastal landscape.

Unit III　　　Elements of Weather and Climate, Composition and Structure of the Atmosphere. World patterns of Atmospheric Temperature, Pressure, and Wind.

Unit IV　　　Atmospheric Moisture, and Disturbances, Climatic Classification (Koppen and Thornthwait) types, characteristics and World patterns.

Unit V　　　Surface relief of Pacific Ocean, Atlantic Ocean, and Indian Ocean. Distribution of Temperature and Salinity of oceans and seas, Currents and Tides, Ocean Deposits and Coral Reefs, and Oceanic Resources.

Books Recommended:
1. Barry, R. G. and Chorley, R. J. (1998): Atmosphere, Weather and Climate. Routledge, London.
2. Bryant, H. Richard (2001): Physical Geography Made Simple, Rupa and Company. New Delhi
3. Bunnett, R.B. (2003): Physical Geography in Diagrams, Fourth GCSE edition, Pearson Education (Singapore) Private Ltd.
4. Garrison, T. (1998): Oceanography, Wordsworth Company., Belmont.
5. Lake, P. (1979): Physical Geography (English and Hindi editions), Cambridge University Press, Cambridge.
6. Lal, D.S. 1993 : Climatology, 3rd edition, Chaitanya Pub. House, New Delhi
7. Leong Goh Cheng (2003): Certificate Physical and Human Geography, Oxford University Press, New Delhi.
8. Monkhouse, F.J. (1979): Physical Geography. Methuen, London
9. Singh, S. (2003): Physical Geography. (English and Hindi editions.). Prayag Pustak Bhawan, Allahabad;
10. Trewartha, G.T., Robinson, A.H., Hammond, E.H., and Horn, A.T. (1976/1990): Fundamentals of Physical Geography, 3rd edition. MacGraw-Hill, New York.
11. Singh, M.B. (2001): *Bhoutik Bhugol,* Tara Book Agency, Varanasi
12. Strahler, A.N. and Stahler, A.M. (1992): Modern Physical Geography. John Wiley and Sons, New York.

B.A. /B.Sc. Part I

PAPER - II
HUMAN GEOGRAPHY
Max. Marks: 50
(Paper Code-0118)

Unit I   Definition and Scope of Human Geography. Man - environment relationship; Determinism, Possibilism, and Probabilism; Human Development Index (HDI).

Unit II   Classification of Human Races – their Characteristics and Distribution; Human adaptation to environment: Eskimos, Bushman, Pigmy, Gond, Masai, and Naga.

Unit III   Growth, Density and Distribution of World Population and factors influencing Spatial distribution; Over , Under, and Optimum Population; Migration of Population. .

Unit IV   Settlements – Urban Settlements: Urbanization, Evolution and Classification, Trends of Urbanization.

             Rural settlements: Characteristics, Types and Regional Pattern, Rural Houses in India - Types, Classification and Regional Pattern.

Unit V   Issues – Global Warming, Climate Change, Deforestation, Desertification, Air, Water and Soil Pollution.

Books Recommended:

1. Chisholm, M. (1985): Human Geography, 2nd edition, Penguin Books, London.
2. De Blij, H.J.(1996): Human Geography: Culture, Society and Space,. 2nd edition. John Wiley and Sons, New York,
3. Fellman, J. D., Arthur, G., Judith, G., Hopkins, J. and Dan, S. (2007): Human Geography: Landscapes of Human Activities. McGraw-Hill, New York. 10th edition.
4. Haggett, P. (2004): Geography: A Modern Synthesis. 8th edition, Harper and Row, New York.
5. Huggett, R. J. (1998): Fundamentals of Biogeography, Routledge, London.
6. Hussain, M. (1994): Human Geography, Rawat Publications, Jaipur.
7. Johnston, R. J., Gregory, D., Pratt, G. and Watts, M. (2009): The Dictionary of Human Geography. 5th edition, Basil Blackwell Publishers, Oxford.
8. Kaushik, S.D. and Sharma, A.K. (1996): Principles of Human Geography (in Hindi), Rastogi Publication, Meerut.
9. Norton, W. (2008): Human Geography, Oxford University Press, New York. 5th ed.
10. Saxena, H. M. (2000): Environmental Management. Rawat Publications., Jaipur and New Delhi.
11. Singh, K. N. and Singh, J. (2001): *Manav Bhugol*. Gyanodaya Prakashan, Gorakhpur. 2nd edition.
12. Singh, L.R. (2005): Fundamentals of Human Geography, Sharda Pustak Bhawan, Allahabad
13. Smith, D. M.(1977): Human Geography- A Welfare Approach, Edward Arnold (Publishers) Ltd.,London
14. Stoddard, R.H., Wishart, D.J. and Blouet, B.W. (1986): Human Geography. Prentice-Hall, Englewood Cliffs, New Jersey.

B.A. /B.Sc. Part I

PAPER - III
PRACTICALGEOGRAPHY
Max. Marks: 50

SECTION A

CARTOGRAPHY AND STASTISTICAL METHODS   (M.M. 25)

Unit I   Scale: Statement Scale , Representative Fraction (R.F.), Linear scale – Simple, Diagonal, Comparative, and Time Scales.

Unit II   Contour: Methods of showing relief; Hachures, Contours; Representation of different landforms by contours.

Unit III   Graph and Diagram: Line graph, Bar Diagram (Simple and Compound), Circle Diagram, Pie Diagram

Unit IV   Statistical Technique: Mean, Median and Mode

SECTION B

SURVEYING -   (M.M. 15)

Unit V   Chain and Tape Survey. Triangulation method, Open Traverse and Closed Traverse

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

Books Recommended:
1. Davis, R.E. and Foote, F.S. (1953): Surveying, 4th edition, McGraw Hill Publication, New York
2. Jones, P.A.(1968): Fieldwork in Geography, Longmans, Green and Company Ltd., First Publication, London
3. Monkhouse, F. J. and Wilkinson, F.J. (1985): Maps and Diagrams. Methuen, London
4. Natrajan, V. (1976): Advanced Surveying, B.I. Publications., Mumbai
5. Pugh, J.C. (1975): Surveying for Field Scientists, Methuen and Company Ltd., London, First Publication.
6. Raisz, E. (1962): General Cartography. John Wiley and Sons, New York. 5th edition.
7. Sarkar, A. K. (1997): Practical Geography: A Systematic Approach. Orient Longman, Kolkata.
8. Sharma, J. P. (2001): *Prayogik Bhugol.,* Rastogi Publication, Meerut 3rd. edition.
9. Singh, R.L. and Singh, Rana P.B. (1993): Elements of Practical Geography. (Hindi and English editions). Kalyani Publishers, New Delhi,.
10. Singh, L.R. (2006): Fundamentals of Practical Geography, Sharda Pustak Bhawan, Allahabad.
11. Venkatramaiah, C. (1997): A Text Book of Surveying, Universities Press, Hyderabad.

B.A. /B.Sc. Part II

PAPER - I
ECONOMIC AND RESOURCES GEOGRAPHY
Max. Marks: 50
(Paper Code-0187)

Unit I   Meaning, scope and approaches to economic geography; Main concepts of economic geography; Resource: concept and classification; Natural resources: soil, forest and water.

Unit II   Mineral resources: iron ore and bauxite; Power resources: coal, petroleum and hydro electricity; Resource conservation; Principal crops: wheat, rice, sugarcane and tea

Unit III   Agricultural regions of the world (Derwent Whittlesey); Theory of agricultural location (Von Thunen); Theory of industrial location (Weber); Major industries: iron and steel, textiles, petrochemical and sugar; industrial regions of the world.

Unit IV   World transportation: major trans-continental railways, sea and air routes; International trade: patterns and trends; Major trade blocks: LAFTA, EEC, ASEAN; Effect of globalization on developing countries.

Unit V   Conservation of resources; evolution of the concept, principles, philosophy, and approach to conservation, resources conservation and practices. Policy making and sustainable development.

Books Recommended:
1. Alexander, J. W. (1988): Economic Geography. Prentice-Hall, New Delhi,.
2. Bryson, J., Henry, N., Keeble, D. and Martin, R. (eds.) (1999): The Economic Geography Reader: Producing and Consuming Global Capitalism. John Wiley and Sons, Inc, New York.
3. Clark,G. L., Gertler, M. S. and Feldman, M. P. (eds.) (2000): The Oxford Handbook of Economic Geography. Oxford University Press, USA.
4. Coe, N. (2007): Economic Geography: A Contemporary Introduction. Blackwell Publishers, Inc., Massachusetts.
5. Gautam, A. (2006): *Aarthik Bhugol Ke Mool Tattava,* Sharda Pustak Bhawan, Allahabad.
6. Guha, J. S. and Chattoraj, P.R. (2002): A New Approach to Economic Geography: A Study of Resources. The World Press Private Limited, Kolkata.
7. Hanink, D. M. (1997): Principles and Applications of Economic Geography: Economy, Policy, Environment. John Wiley and Sons, Inc, New York.
8. Hartshorne, T. A. and Alexander, J. W. (1988): Economic Geography (3rd revised edition) Englewood Cliff , New Jersey, Prentice Hall
9. Hudson, R. (2005): Economic Geographies: Circuits, Flows and Spaces. Sage Publications, London.
10. Knowles, R, Wareing, J. (2000): Economic and Social Geography Made Simple, Rupa and Company, New Delhi.

B.A. /B.Sc. Part II

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PAPER - II

GEOGRAPHY OF INDIA

Max. Marks: 50
(Paper Code-0188)

</div>

Unit I   Physical Features: Structure, Relief, Climate, Physiographic Regions, Drainage, Climate-origin and mechanism of monsoon, and regional and Seasonal variation.

Unit II   Natural Resources: Soils - types, their distribution and characteristics. Water Resources (major irrigation and hydel power projects); Forests-types, distribution, economic significance and conservation. Mineral and Power resources-Iron-ore, Manganese, Copper, Coal, Petroleum and Natural gas, Non conventional sources of energy.

Unit III   Cultural Features : Population - Growth, Density and Distribution. Agriculture - Major crops, impact of Green Revolution and Agricultural regions.

Unit IV   Industries Localization, Development & Production - Iron and steel, Cotton Textile, Cement, Sugar, Transport, Foreign Trade. Industrial Region.

Unit V   Detailed Study of the following regions of India : Kashmir Valley, North- East Region, Chhota Nagpur Plateau, Thar Desert, Islands of India.

Books Recommended:
1. Chauhan, P.R. and Prasad, M. (2003): *Bharat Ka Vrihad Bhugol*, Vasundhara Prakashan, Gorakhpur.
2. Farmer, B.H. (1983): An Introduction to South Asia. Methuen, London
3. Gautam, A. (2006): Advanced Geography of India, Sharda Pustak Bhawan, Allahabad
4. Johnson, B.L.C. (1963): Development in South Asia. Penguin Books, Harmondsworth
5. Krishnan, M.S. (1982): Geology of India and Burma, CAS Publishers and Distributors, Delhi.
6. Khullar, D.R. (2007): India: A Comprehensive Geography, Kalyani Publishers, New Delhi
7. Nag, P. and Gupta, S. S. (1992): Geography of India, Concept Publishing Company, New Delhi.
8. Rao, B.P. (2007): *Bharat kee Bhaugolik Sameeksha*, Vasundhara Prakashan, Gorakhpur.
9. Sharma, T.C. and Coutinho, O. (2003): Economic and Commercial Geography of India, Vikas Publishing House Private Ltd. New Delhi.
10. Singh , J. (2003): India: A Comprehensive Systematic Geography. Gyanodaya Prakashan, Gorakhpur
11. Singh, J. (2001): *Bharat: Bhougolik Aadhar Avam Ayam*, Gyanodaya Prakashan, Gorakhpur.
12. Singh, R.L. (ed.) (1971): India: A Regional Geography. National Geographical Society of India, Varanasi.
13. Spate, O.H. K., Learmonth A. T. A. and Farmer, B. H. (1996): India, Pakistan and Sri Lanka. Methuen, London, 7th edition.
14. SukhwaI, B.L. (1987): India: Economic Resource Base and Contemporary Political Patterns. Sterling Publication, New Delhi
15. Tiwari, R.C. (2007): Geography of India, Prayag Pustak Bhawan, Allahabad.
16. Wadia, D. N. (1959): *Geology of India*. Mac-Millan and Company, London and student edition, Madras.

B.A. /B.Sc. Part II

PAPER - III
PRACTICAL GEOGRAPHY
Max. Marks: 50

SECTION A
MAP INTERPRETATION, PROJECTIONS AND STATISTICAL METHODS   (M.M. 25)

Unit I   Distribution Maps: Dot Map, Choropleth Map and Isopleth Map.

Unit II   Map Projections: Definition and classification; Conical, Zenithal, and Cylindrical Projections.

Unit III   Interpretation of Weather Maps: Use of Meteorological Instruments.

Unit IV   Statistical Methods: Quartile: Mean Deviation, Standard Deviation and Quartile Deviation; Relative Variability and Co-efficient of Variation.

SECTION B
SURVEYING   (M.M. 15)
Unit V   Surveying: Whole Circle Bearing and Reduced Bearing, Methods of Prismatic Compass Survey.

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

Books Recommended:

1. Alvi, Z. 1995 : Statistical Geography: Methods and Applications, Rawat Pub. New Delhi: .
2. Davis, R.E. and Foote, F.S. (1953): Surveying, 4th edition, McGraw Hill Publication, New York
3. Kanetker, T.P. and Kulkarni, S.V.(1967): Surveying and Levelling, Vol I and II V.G. Prakashan, Poona.
4. Natrajan, V. (1976): Advanced Surveying, B.I. Publications., Mumbai.
5. Pal, S.K. 1999 : Statistics for Geoscientists, Concept publishing Company, New Delhi
6. Punmia, B.C.(1994): Surveying, Vol I, Laxmi Publications Private Ltd, New Delhi.
7. Raisz, E. (1962): General Cartography. John Wiley and Sons, New York. 5th edition
8. Sarkar, A. K. (1997): Practical Geography: A Systematic Approach. Orient Longman, Kolkata.
9. Sharma, J. P. (2001): *Prayogik Bhugol.,* Rastogi Publication, Meerut 3rd. edition.
10. Silk, J. 1979 : Statistical techniques in Geography, George Allen and Unwin, London
11. Singh, R.L. and Singh, Rana P.B. (1993): Elements of Practical Geography. (Hindi and English editions). Kalyani Publishers, New Delhi,.
12. Singh, L.R. (2006): Fundamentals of Practical Geography, Sharda Pustak Bhawan, Allahabad.
13. Venkatramaiah, C. (1997): A Text Book of Surveying, Universities Press, Hyderabad.

B.A./B.Sc Part III

PAPER - I
REMOTE SENSING AND GIS
Max. Marks: 50
(Paper Code-0248)

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, Toposheets, 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-tsung Chang (2003) Geographic Information Systems, Tata McGraw Hill, New Delhi
5. Lillesand, 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,

B.A./B.Sc Part III

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PAPER - II

GEOGRAPHY OF CHHATTISGARH

Max. Marks: 50

(Paper Code-0249)
</div>

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 Akadmi, Raipur
2. Kumar, Pramila (2003): Chhattisgarh Ek Bhugolik Addhyayan. Madhya Pradesh Hindi Granth Akadmi, Bhopal
3. Nagesh Jitendra and at all (2014): Chhattisgarh Sandarbh 2014 Jansanmpark Vibhag, C.G. Govt., Raipur
4. Tiwari, Vijay Kumar (   ): Geography of Chhattisgarh, Himalya Publishing House, Pvt. Ltd
5. Tripathi, Kaushlendra and Pursottam Chandrakar (2001): Geography of Chhattisgarh, Shardaprakashan, Aazad Nagar , Bilaspur.
6. Verma ,L.N. (2017): Geography of Chhattisgarh, Madhya Pradesh Hindi Granth Akadmi, Bhopal

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 /Landcover 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*. Blandford Press, London.
3. Campell, J. B. (2003): Introduction to Remote Sensing. 4th edition. Taylor and Francis, London.
4. Chaunial, 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. `
9. Deekshatulu, B.L. and Rajan, Y.S. (ed.) (1984): Remote Sensing. Indian Academy of Science, Bangalore.
10. Floyd, F. and Sabins, Jr. (1986): Remote Sensing: Principles and Interpretation. W.H. Freeman, New York.

11. Gautam, N.C. and Raghavswamy, V. (2004). Land Use/ Land Cover and Management Practices in India. B.S. Publication., Hyderabad.
12. Jensen, J.R. (2004): Remote Sensing of the Environment: An Earth Resource Perspective. Prentice-Hall, Englewood Cliffs, New Jersey. Indian reprint available.
13. Jones, P.A.(1968): Fieldwork in Geography, Longmans, Green and Company Ltd., First Publication, London
14. Kanetker, T.P. and Kulkarni, S.V.(1967): Surveying and Levelling, Vol I and II V.G. Prakashan, Poona.
15. Lillesand, T.M. and Kiefer, R.W. (2000): Remote Sensing and Image Interpretation. John Wiley and Sons, New York.
16. Monkhouse, F. J. (1985): Maps and Diagrams. Methuen, London.
17. Nag, P. (ed.) (1992): Thematic Cartography and Remote Sensing. Concept Publishing Company, New Delhi.
18. Natrajan, V. (1976): Advanced Surveying, B.I. Publications., Mumbai.
19. Rampal, K.K. (1999): Handbook of Aerial Photography and Interpretation. Concept Publishing. Company, New Delhi.
20. Raisz, E. (1962): Principles of Cartography, McGraw Hill, New York.
21. 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.
22. Sarkar, A. K. (1997): Practical Geography: A Systematic Approach. Orient Longman, Kolkata
23. Sharma, J. P. (2001): *Prayogik Bhugol*., Rastogi Publication, Meerut 3rd. edition.
24. Singh, R.L. and Singh Rana P.B. (1993): *Elements of Practical Geography*. (Hindi and English editions). Kalyani Publishers, New Delhi.
25. Stoddard, Robert H. (1982): *Field Techniques and Research Methods in Geography*. Kendall/Hunt Pub. Dubuque IO.

बी.ए./बी.एस.सी. – प्रथम वर्ष
प्रश्न पत्र–प्रथम
भौतिक भूगोल

अधिकतम अंक : 50

(कोड क्रमांक 0117)

इकाई –1. भौतिक भूगोल की प्रकृति एवं विषय क्षेत्र, पृथ्वी की उत्पत्ति, भूगर्भिक समय मापनी, पृथ्वी की आंतरिक संरचना, वेगनर का महाद्वीपीय प्रवाह सिद्धांत, पट्ट विवर्तन, भूसंतुलन ।

इकाई –2. पृथ्वी की हलचल–भूकंप, ज्वालामुखी, चट्टान अपक्षय, अपरदन, सामान्य अपरदन चक्र, वायु, हिम बहता जल, भूमिगत जल और सागरीय जल से निर्मित भूदृश्य ।

इकाई –3. मौसम और जलवायु के तत्व, वायुमंडल की संरचना एवं संघटन, वायुमंडलीय ताप, दाब तथा हवाएं ।

इकाई –4. वायुमंडलीय आर्द्रता विक्षोम, जलवायु वर्गीकरण कोपेन और थार्नथ्वेट के आधार पर वैश्विक जलवायु की विशेषताएॅ और विश्व प्रतिरूप ।

इकाई –5. महासागरीय उच्चावच्च प्रशांत महासागर, आंध्रमहासागर एवं हिन्द महासागर । सामुद्रिक तापमान लवणता जलधाराएॅ एवं, ज्वारभाटा, सामुद्रिक निक्षेप एवं प्रवाल भित्ती, सामुद्रिक संसाधन ।

Books Recommended:

1. Barry, R. G. and Chorley, R. J. (1998): Atmosphere, Weather and Climate. Routledge, London.
2. Bryant, H. Richard (2001): Physical Geography Made Simple, Rupa and Company. New Delhi
3. Bunnett, R.B. (2003): Physical Geography in Diagrams, Fourth GCSE edition, Pearson Education (Singapore) Private Ltd.
4. Garrison, T. (1998): Oceanography, Wordsworth Company., Belmont.
5. Lake, P. (1979): Physical Geography (English and Hindi editions), Cambridge University Press, Cambridge.
6. Lal, D.S. 1993 : Climatology, 3rd edition, Chaitanya Pub. House, New Delhi
7. Leong Goh Cheng (2003): Certificate Physical and Human Geography, Oxford University Press, New Delhi.
8. Monkhouse, F.J. (1979): Physical Geography. Methuen, London
9. Singh, S. (2003): Physical Geography. (English and Hindi editions.). Prayag Pustak Bhawan, Allahabad;
10. Trewartha, G.T., Robinson, A.H., Hammond, E.H., and Horn, A.T. (1976/1990): Fundamentals of Physical Geography, 3rd edition. MacGraw-Hill, New York.
11. Singh, M.B. (2001): *Bhoutik Bhugol,* Tara Book Agency, Varanasi
12. Strahler, A.N. and Stahler, A.M. (1992): Modern Physical Geography. John Wiley and Sons, New York.

बी.ए./बी.एस.सी. –प्रथम वर्ष
प्रश्न पत्र–द्वितीय
मानव भूगोल

अधिकतम अंक : 50

(कोड क्रमांक 0118)

इकाई –1. मानव भूगोल की परिभाषा एवं विषय क्षेत्र मानव वातावरण संबंध, निश्चयवाद, सम्भववाद

प्रसम्भववाद, मानव विकास सूचकांक ।

इकाई –2. मानव प्रजाति उद्भव प्रकार विशेषताएँ एवं वितरण, मानव द्वारा वातावरण से अनुकुलन एस्किमो, बुशमेन,

पिग्मी, गोंड, मसाई, और नागा ।

इकाई –3. वैश्विक जनसंख्या– वृद्धि, घनत्व, जनसंख्या के वितरण को प्रभावित करने वाले स्थानिक कारक,

जनाधिक्य, न्यूनतम जनसंख्या और अनूकूलतम आदर्श जनसंख्या, जनसंख्या एवं प्रवास।

इकाई –4. अधिवास– नगरीय अधिवासः नगरीयकरण उद्भव, प्रकार एवं नगरीकरण के प्रतिरूप ।

ग्रामीण अधिवास : विशेषताएँ ं, प्रकार और क्षेत्रीय प्रतिरूप, भारत में ग्रामीण अधिवास, प्रकार, वर्गीकरण

और क्षेत्रीय प्रतिरूप ।

इकाई –5. उभरते पर्यावरणीय मुद्दे– ग्लोबल वार्मिंग, जलवायु परिवर्तन निर्वनिकरण, मरूस्थलीकरण प्रदूषण –

जल, वायु और मृदा प्रदूषण ।

Books Recommended:
1. Chisholm, M. (1985): Human Geography, 2nd edition, Penguin Books, London.
2. De Blij, H.J.(1996): Human Geography: Culture, Society and Space,. 2nd edition. John Wiley and Sons, New York,
3. Fellman, J. D., Arthur, G., Judith, G., Hopkins, J. and Dan, S. (2007): Human Geography: Landscapes of Human Activities. McGraw-Hill, New York. 10th edition.
4. Haggett, P. (2004): Geography: A Modern Synthesis. 8th edition, Harper and Row, New York.
5. Huggett, R. J. (1998): Fundamentals of Biogeography, Routledge, London.
6. Hussain, M. (1994): Human Geography, Rawat Publications, Jaipur.
7. Johnston, R. J., Gregory, D., Pratt, G. and Watts, M. (2009): The Dictionary of Human Geography. 5th edition, Basil Blackwell Publishers, Oxford.
8. Kaushik, S.D. and Sharma, A.K. (1996): Principles of Human Geography (in Hindi), Rastogi Publication, Meerut.
9. Norton, W. (2008): Human Geography, Oxford University Press, New York. 5th ed.
10. Saxena, H. M. (2000): Environmental Management. Rawat Publications., Jaipur and New Delhi.
11. Singh, K. N. and Singh, J. (2001): *Manav Bhugol*. Gyanodaya Prakashan, Gorakhpur. 2nd edition.
12. Singh, L.R. (2005): Fundamentals of Human Geography, Sharda Pustak Bhawan, Allahabad
13. Smith, D. M.(1977): Human Geography- A Welfare Approach, Edward Arnold (Publishers) Ltd.,London
14. Stoddard, R.H., Wishart, D.J. and Blouet, B.W. (1986): Human Geography. Prentice-Hall, Englewood Cliffs, New Jersey.

अधिकतम अंक : 50

भाग— अ मानचित्र तकनीक एवं सांख्यिकी विधियां (25)

इकाई —1 मपनी— कथनात्मक मापन, प्रतिनिधि भिन्न सामान्य रैखिक मापनी विकर्ण तुलनात्मक एवं समय मापनी.

इकाई —2 उच्चावच प्रदर्शन की विधियां — हैश्यूर समोच्च रेखा, तथा विविध स्थलाकृतियों की प्रदर्शन.

इकाई —3 रैखिक आरेख, दंड आरेख, (सामान्य एवं मिश्रित) चक्र आरेख — समानुपातिक वृत्त आरेख विभाजित वृतारेख

इकाई —4 सांख्यिकी विधियां : औसत, माध्यिका , बहुलक

भाग— ब सर्वेक्षण (15)

इकाई —5 चैन और फीता सर्वेक्षण—त्रिभुजीकरण, खुला एवं बंद मार्ग मापन,

प्रायोगिक पुस्तिका और मौखिक परिक्षण परीक्षा (10)

Books Recommended:
1. Davis, R.E. and Foote, F.S. (1953): Surveying, 4th edition, McGraw Hill Publication, New York
2. Jones, P.A.(1968): Fieldwork in Geography, Longmans, Green and Company Ltd., First Publication, London
3. Monkhouse, F. J. and Wilkinson, F.J. (1985): Maps and Diagrams. Methuen, London
4. Natrajan, V. (1976): Advanced Surveying, B.I. Publications., Mumbai
5. Pugh, J.C. (1975): Surveying for Field Scientists, Methuen and Company Ltd., London, First Publication.
6. Raisz, E. (1962): General Cartography. John Wiley and Sons, New York. 5th edition.
7. Sarkar, A. K. (1997): Practical Geography: A Systematic Approach. Orient Longman, Kolkata.
8. Sharma, J. P. (2001): *Prayogik Bhugol.,* Rastogi Publication, Meerut 3rd. edition.
9. Singh, R.L. and Singh, Rana P.B. (1993): Elements of Practical Geography. (Hindi and English editions). Kalyani Publishers, New Delhi,.
10. Singh, L.R. (2006): Fundamentals of Practical Geography, Sharda Pustak Bhawan, Allahabad.
11. Venkatramaiah, C. (1997): A Text Book of Surveying, Universities Press, Hyderabad.

बी.ए./बी.एस.सी. –द्वितीय वर्ष
प्रश्न पत्र–प्रथम
आर्थिक एवं संसाधन भूगोल

(कोड क्रमांक 0187)

अधिकतम अंकः 50

इकाई–1 : आर्थिक भूगोल का अर्थ, विषय क्षेत्र एवं उपागम; आर्थिक भूगोल की आधारभूत संकल्पनायें; संसाधन : संकल्पनायें एवं वर्गीकरण; प्राकृतिक संसाधन : मिट्टी, वन एवं जल ।

इकाई–2 : खनिज संसाधन : लौह अयस्क एवं बाक्साईट; शक्ति संसाधन कोयला, पेट्रोलियम एवं जल विद्युत; संसाधन संरक्षण ; प्रमुख फसलेः गेहूँ, चाँवल, गन्ना, एवं चाय ।

इकाई–3 : विश्व के कृषि प्रदेश (व्हिटलसी के अनुसार); कृषि अवस्थिति के सिद्धान्त (वॉन थ्यूनेन); औधोगिक स्थानीयकरण का सिद्धान्त (वेबर); प्रमुख उद्योग : लौह एवं इस्पात, वस्त्र उद्योग, शैलरासायनिक एवं शक्कर; विश्व के औद्योगिक प्रदेश ।

इकाई–4 : विश्व परिवहन : प्रमुख ट्रांस महाद्वीपीय रेलवे, समुद्र एवं वायु मार्ग; अंतर्राष्ट्रीय व्यापार प्रतिरुप एवं प्रवृत्तियाँ; प्रमुख व्यापार संघ : लैटिन अमेरिकी स्वतंत्र व्यापार संघ (LAFTA), यूरोपीय साझा बाजार (EEC), दक्षिणी–पूर्वी एशियाई राष्ट्रों का संघ (ASEAN), विकासशील देशों पर भूमण्डलीकरण का प्रभाव ।

इकाई–5 : संसाधनों का संरक्षण; संकल्पनाओं का उद्भव, सिद्धात, दर्शन एवं संरक्षण के उपागम, संसाधन संरक्षण एवं प्रवृत्तियाँ, अक्षय विकास एवं नीति निर्माण ।

Books Recommended:
1. Alexander, J. W. (1988): Economic Geography. Prentice-Hall, New Delhi,.
2. Bryson, J., Henry, N., Keeble, D. and Martin, R. (eds.) (1999): The Economic Geography Reader: Producing and Consuming Global Capitalism. John Wiley and Sons, Inc, New York.
3. Clark,G. L., Gertler, M. S. and Feldman, M. P. (eds.) (2000): The Oxford Handbook of Economic Geography. Oxford University Press, USA.
4. Coe, N. (2007): Economic Geography: A Contemporary Introduction. Blackwell Publishers, Inc., Massachusetts.
5. Gautam, A. (2006): *Aarthik Bhugol Ke Mool Tattava,* Sharda Pustak Bhawan, Allahabad.
6. Guha, J. S. and Chattoraj, P.R. (2002): A New Approach to Economic Geography: A Study of Resources. The World Press Private Limited, Kolkata.
7. Hanink, D. M. (1997): Principles and Applications of Economic Geography: Economy, Policy, Environment. John Wiley and Sons, Inc, New York.
8. Hartshorne, T. A. and Alexander, J. W. (1988): Economic Geography (3rd revised edition) Englewood Cliff , New Jersey, Prentice Hall
9. Hudson, R. (2005): Economic Geographies: Circuits, Flows and Spaces. Sage Publications, London.
10. Knowles, R, Wareing, J. (2000): Economic and Social Geography Made Simple, Rupa and Company, New Delhi.

बी.ए. / बी.एस.सी. द्वितीय वर्ष
प्रश्न पत्र— द्वितीय
भारत का भूगोल

(कोड क्रमांक 0188)

अधिकतम अंक: 50

इकाई —1 भौगोलिक स्वरूप — संरचना, उच्चावच जलवायु, भू—आकृतिक प्रदेश, अपवाह, जलवायु—मानसून की उत्पत्ति एवं विकास प्रक्रिया तथा पादेशिक एवं मौसमी विविधता।

इकाई —2 प्राकृतिक संसाधन — मिट्टियॉं, प्रकार, वितरण एवं विशेषताएँ, जल संसाधन, सिंचाई और बहुउद्देशीय परियोजनाएं, वन—प्रकार, वितरण आर्थिक महत्व एवं संरक्षण । खनिज एवं शक्ति के संसाधन — लौह अयस्क, मैग्नीज, तांबा, कोयला, प्रेट्रोलियम और प्राकृतिक गैस, गैर पारंपरिक उर्जा , (सौर उर्जा, पवन उर्जा ज्वारीय उर्जा, भूतापीय उर्जा)।

इकाई —3 सांस्कृतिक तत्व, जनसंख्या वृद्धि , घनत्व और वितरण, कृषि प्रमुख खाद्य फसलें, हरित क्रांति का प्रभाव, कृषि प्रदेश, ।

इकाई —4 उद्योग—स्थानीकरण, औद्योगिक विकास और उत्पादन — लौहा और इस्पात उद्योग, सूती वस्त्र उद्योग, सीमेंट, चीनी ,यातायात और व्यापार, औद्योगिक प्रदेश ।

इकाई —5 भारत के निम्न प्रदेशों का विस्तृत अध्ययन कश्मीर घाटी, उत्तर पूर्वी प्रदेश, छोटा नागपुर का पठार, थार मरूस्थल भारत के द्वीप समूह।

Books Recommended:

1. Chauhan, P.R. and Prasad, M. (2003): *Bharat Ka Vrihad Bhugol*, Vasundhara Prakashan, Gorakhpur.
2. Farmer, B.H. (1983): An Introduction to South Asia. Methuen, London
3. Gautam, A. (2006): Advanced Geography of India, Sharda Pustak Bhawan, Allahabad
4. Johnson, B.L.C. (1963): Development in South Asia. Penguin Books, Harmondsworth
5. Krishnan, M.S. (1982): Geology of India and Burma, CAS Publishers and Distributors, Delhi.
6. Khullar, D.R. (2007): India: A Comprehensive Geography, Kalyani Publishers, New Delhi
7. Nag, P. and Gupta, S. S. (1992): Geography of India, Concept Publishing Company, New Delhi.
8. Rao, B.P. (2007): *Bharat kee Bhaugolik Sameeksha*, Vasundhara Prakashan, Gorakhpur.
9. Sharma, T.C. and Coutinho, O. (2003): Economic and Commercial Geography of India, Vikas Publishing House Private Ltd. New Delhi.
10. Singh , J. (2003): India: A Comprehensive Systematic Geography. Gyanodaya Prakashan, Gorakhpur
11. Singh, J. (2001): *Bharat: Bhougolik Aadhar Avam Ayam*, Gyanodaya Prakashan, Gorakhpur.
12. Singh, R.L. (ed.) (1971): India: A Regional Geography. National Geographical Society of India, Varanasi.
13. Spate, O.H. K., Learmonth A. T. A. and Farmer, B. H. (1996): India, Pakistan and Sri Lanka. Methuen, London, 7th edition.
14. SukhwaI, B.L. (1987): India: Economic Resource Base and Contemporary Political Patterns. Sterling Publication, New Delhi
15. Tiwari, R.C. (2007): Geography of India, Prayag Pustak Bhawan, Allahabad.
16. Wadia, D. N. (1959): *Geology of India*. Mac-Millan and Company, London and student edition, Madras.

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

अधिकतम अंक : 50

खण्ड–अ. मानचित्र की व्याख्या, प्रक्षेप और सांख्यिकीय विधियां । (25 अंक)

इकाई –1 मानचित्र – बिन्दु विधि, छाया विधि, सममान रेखा मानचित्र (मानचित्र निर्माण)

इकाई –2 प्रक्षेप – परिभाषा एवं प्रकार शंक्वाकार, खमध्य बेलनाकार प्रक्षेप.

इकाई –3 मौसम मानचित्र की व्याख्या एवं मौसम संबंधी उपकरणों का उपयोग.

इकाई –4 सांख्यिकीय विधियां – विचलन– चतुर्थांक माध्य विचलन, मानक विचलन, चतुर्थक विचलन, सापेक्षिक परिवर्तनशीलता, प्रसरण गुणंक।

खण्ड–ब. सर्वेक्षण (15 अंक)

इकाई –5 प्रिज्मीय सर्वेक्षण– पूर्णवृत दिक्मान, समानीत दिक्मान एवं प्रिज्मीय कम्पास सर्वेक्षण की विधियाॅ।

प्रायोगिक पुस्तिका और मौखिक परीक्षा (10 अंक)

Books Recommended:

1. Alvi, Z. 1995 : Statistical Geography: Methods and Applications, Rawat Pub. New Delhi: .
2. Davis, R.E. and Foote, F.S. (1953): Surveying, 4th edition, McGraw Hill Publication, New York
3. Kanetker, T.P. and Kulkarni, S.V.(1967): Surveying and Levelling, Vol I and II V.G. Prakashan, Poona.
4. Natrajan, V. (1976): Advanced Surveying, B.I. Publications., Mumbai.
5. Pal, S.K. 1999 : Statistics for Geoscientists, Concept publishing Company, New Delhi
6. Punmia, B.C.(1994): Surveying, Vol I, Laxmi Publications Private Ltd, New Delhi.
7. Raisz, E. (1962): General Cartography. John Wiley and Sons, New York. 5th edition
8. Sarkar, A. K. (1997): Practical Geography: A Systematic Approach. Orient Longman, Kolkata.
9. Sharma, J. P. (2001): *Prayogik Bhugol.*, Rastogi Publication, Meerut 3rd. edition.
10. Silk, J. 1979 : Statistical techniques in Geography, George Allen and Unwin, London
11. Singh, R.L. and Singh, Rana P.B. (1993): Elements of Practical Geography. (Hindi and English editions). Kalyani Publishers, New Delhi,.
12. Singh, L.R. (2006): Fundamentals of Practical Geography, Sharda Pustak Bhawan, Allahabad.
13. Venkatramaiah, C. (1997): A Text Book of Surveying, Universities Press, Hyderabad.

बी.ए./बी.एस.सी. तृतीय वर्ष
प्रश्न पत्र–प्रथम
सुदूर संवेदन एवं भैगोलिक सूचना प्रणाली
(पेपर कोड़ – 0248)

अधिकतम अंकः 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, रेडियोमेट्रिक विभेदन, अल्पकालिक विभेदन, उत्पाद ।

इकाई –3 : चाक्षुष एवं अंकीय बिम्ब प्रक्रियान्वयन 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-tsung Chang (2003) Geographic Information Systems, Tata McGraw Hill, New Delhi
5. Lillesand, 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
प्रश्न पत्र–द्वितीय
छत्तीसगढ़ का भूगोल
(पेपर कोड – 0249)

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

   परियोजनाएं, 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 Akadmi, Raipur
   2. Kumar, Pramila (2003): Chhattisgarh Ek Bhugolik Addhyayan. Madhya Pradesh Hindi Granth Akadmi, Bhopal
   3. Nagesh Jitendra and at all (2014): Chhattisgarh Sandarbh 2014 Jansanmpark Vibhag, C.G. Govt., Raipur
   4. Tiwari, Vijay Kumar (   ): Geography of Chhattisgarh, Himalya Publishing House, Pvt. Ltd
   5. Tripathi, Kaushlendra and Pursottam Chandrakar (2001): Geography of Chhattisgarh, Shardaprakashan, Aazad Nagar , Bilaspur.
   6. Verma ,L.N. (2017): Geography of Chhattisgarh, Madhya Pradesh Hindi Granth Akadmi, Bhopal

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 विष्लेषण, राष्ट्रीय एवं अन्तराष्ट्रीय, भौतिक एवं सांस्कृतिक तत्वों के आधार पर विष्लेषण ।

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*. Blandford Press, London.
3. Campell, J. B. (2003): Introduction to Remote Sensing. 4th edition. Taylor and Francis, London.
4. Chaunial, 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. `
9. Deekshatulu, B.L. and Rajan, Y.S. (ed.) (1984): Remote Sensing. Indian Academy of Science, Bangalore.
10. Floyd, F. and Sabins, Jr. (1986): Remote Sensing: Principles and Interpretation. W.H. Freeman, New York.
11. Gautam, N.C. and Raghavswamy, V. (2004). Land Use/ Land Cover and Management Practices in India. B.S. Publication., Hyderabad.
12. Jensen, J.R. (2004): Remote Sensing of the Environment: An Earth Resource Perspective. Prentice-Hall, Englewood Cliffs, New Jersey. Indian reprint available.
13. Jones, P.A.(1968): Fieldwork in Geography, Longmans, Green and Company Ltd., First Publication, London

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

प्रपत्र

विषय / संकाय / प्रश्न—पत्र का नाम— **B.Sc. Information Technology**

क्रमांक	कक्षा का नाम	वर्तमान पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम का औचित्य
1.	1st Year	FUNDAMENTAL OF I.T. COMPUTERS & PC SOFTWARE	FUNDAMENTAL OF IT, COMPUTER AND PC SOFTWARE	Updation Required
2.	1st Year	PROGRAMMING CONCEPT USING C LANGUAGE	PROGRAMMING IN 'C' LANGUAGE	Updation Required
3.	1st Year	PRACTICAL	PRACTICAL	Updation Required
4.	2nd Year	DIGITAL CIRCUITS & COMPUTER H/W	DIGITAL CIRCUITS & COMPUTER H/W	No Change
5.	2nd Year	PAPER-II (PAPER CODE - 0875)	PAPER-II (PAPER CODE - 0875)	No Change
6.	2nd Year	PRACTICAL	PRACTICAL	No Change
7.	3rd Year	AMPLIFIERS AND OSCILLATORS	AMPLIFIERS AND OSCILLATORS	No Change
8.	3rd Year	FUNDAMENTAL DATA STRUCTURE	FUNDAMENTAL DATA STRUCTURE	No Change
9.	3rd Year	PRACTICAL	PRACTICAL	No Change

केन्द्रीय अध्ययन मंडल के अध्यक्ष एवं सदस्यों का हस्ताक्षर

S.N.	Name	Designation/University/College	Signature with Date
1.	Dr. Sanjay Kumar	Head, S.o.S. in Computer Science & I.T., Pt. R.S. University, Raipur	*(signature)* 11-06-2018
2.	Mr. Hari Shankar Prasad Tonde	Head, Dept. of Computer Science, Sarguja University, Ambikapur	*(signature)* 11-06-18
3.	Dr. Anuj Kumar Dwivedi	Head, Dept. of Computer Science, Govt. V.B.S.D. Girls College, Jashpur Nagar, Jashpur	*(signature)* 11/6/18
4.	Mr. L.K. Gavel	Head, Dept. of Computer Science, Govt. G.S.G. P.G. College Balod	*(signature)* 11/06/18
5.	Dr. J. Durga Prasad Rao	Head, Dept. of Computer Science, Shri Sankracharya Mahavidyalaya, Bhilai	*(signature)* 11/6/18

B.Sc. Part – I
INFORMATION TECHNOLOGY
PAPER - I
FUNDAMENTAL OF IT, COMPUTER AND PC SOFTWARE
(PAPER CODE - 0824)

Max Marks: 50

NOTE: The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT - I INFORMATION TECHNOLOGY

Concepts of IT and Information System, Application of IT (in Business, Education, Medicine, Science, Governance and Agriculture), Impact of IT on society and industry, Legal and Ethical aspect of IT, Security and Threats in IT, M-Commerce, Virtual reality, Latest trend in IT, Future of IT.

UNIT - II COMPUTER NETWORK

BASIC CONCEPTS OF COMPUTER NETWORK: Internet concepts, LAN, MAN, WAN, Topology, Protocol, Transmission mode, communication process, Required elements of Data Communication.
WIRELESSCOMMUNICATION: Mobile Internet, GPS, 3G, 4G, Wi-Fi, Bluetooth, infrared, radio frequency, microwave.
SOCIAL NETWORKING: Evolution of social network sites (YouTube, Facebook, LinkedIn, Twitter), Advantages and Disadvantages of social networking sites.

UNIT - III MS-WORD

Introduction, Word Processing (MS-WORD), Advantage of word processing, Introduction and Installation, Editing a file, using paragraph styles. Newspaper style columns, Using macros, Advance word processing, Headers and footers, Finding text, Setting up printer. Mail merge and other applications, Mathematical calculator, Table handling.

UNIT - IV MS-EXCEL

Introduction to spreadsheet (MS-EXCEL), Definition and advantage of electronic worksheet, Working on spread sheets, Range and related operations, Setting saving and retrieving worksheets, Inserting, Deleting, Coping and Moving of data cells, Inserting and deleting rows and column, Protecting cells, Printing a worksheet, Erasing a worksheet in Graphs creation, Types of graphs, Creating a chart sheet 3D, Columns charts, Moving and changing the size of chart, Printing the chart.

UNIT - V MS-POWER POINT AND MS-ACCESS

MS-POWER POINT: Presenting with Power point: Creating presentation, Working with slides, Different types of slides, Setting page layout, Selecting background and applying design, Adding graphics to slide, Adding sound and movie, Creating chart and graph, Playing a slide show, Slide transition, Advancing slides, Setting time, Rehearsing timing, Animating slide, Animating objects, Running the show from window.
MS-ACCESS: Creating tables in access, Defining data types, Manipulating records.

TEXT BOOKS:

1. Computer Fundamentals, P. K. Sinha, BPB Publications, Sixth Edition.
2. Introduction to Information Technology, V. Rajaraman, PHI, Second Edition.
3. Computer Networks, Forouzan, Tata McGraw-Hill, Second, Edition.
4. Microsoft Office 2007 fundamentals, L Story, D Walls.
5. MS Office, S. S. Shrivastava, Firewall Media

B. Sc. PART - I
INFORMATION TECHNOLOGY
PAPER II
PROGRAMMING IN 'C' LANGUAGE

Max Marks: 50

NOTE: The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT-I

Fundamentals of C Programming: Overview of C: History of 'C', Structure of 'C' program. Keywords, Tokens, Data types, Constants, Literals and Variables, Operators and Expressions: Arithmetic operators, Relational operator, Logical operators, Expressions, Operator: operator precedence and associatively, Type casting, Console I/O formatting, Unformatted I/O functions: getch(), getchar, getche(), getc(), putc(), putchar().

UNIT II

Control Constructs: If-else, conditional operators, switch and break, nested conditional branching statements, loops: do while, while, for, Nested loops, break and continue, goto and label, exit function.

Functions: Definition, function components: Function arguments, return value, function call statement, function prototype, Types of function, Scope and lifetime of variable, Call by value and call by reference. Function using arrays, function with command line argument. User defined function: maths and character functions, Recursive function.

UNIT-III

Array: Array declaration, One and Two dimensional numeric and character arrays, Multidimensional arrays.

String: String declaration, initialization, string manipulation with/without using library function.

Structure, Union and Enum - Structure: Basics, declaring structure and structure variable, typedef statement, array of structure, array within structure, Nested structure, passing structure to function, function returning structure. **Union:** basics, declaring union and union variable, **Enum:** declaring enum and enum variable.

UNIT- IV

Pointer: Definition of pointer, Pointer declaration, Using & and * operators. Void pointer, Pointer to pointer, Pointer in math expression, Pointer arithmetic, Pointer comparison, Dynamic memory allocation functions – malloc, calloc, realloc and free, Pointer vs. Array, Array of pointer, Pointer to array, Pointers to function, Function returning pointer, Passing function as Argument to function, Pointer to structure, Dynamic array of structure through pointer to structure.

UNIT-V

File Handling and Miscellaneous Features: File handling: file pointer, File accessing functions: fopen, fclose, fputc, fgetc, fprintf, fscanf, fread, fwrite, eof, fflush, rewind, fseek, ferror. File handling through command line argument. Introduction to C preprocessor #include, #define, Conditional compilation directives: #if, #else, #elif, #endif, #ifndef etc.

TEXT BOOKS:

1. Programming in ANSI C, E Balagurusamy, Tata McGraw-Hill, Third Edition.
2. Let Us C, YashwantKanetkar, Infinity Science Press, Eighth Edition.
3. Mastering C, K R Venugopal, Tata McGraw-Hill.
4. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, Prentice Hall, Second Edition.
5. Applications Programming in ANSI C, R. Johnsonbaugh, Martin Kalin, Macmillan, Second Edition.
6. The Spirit of C, Mullish Cooper, Jaico publishing House.
7. How to solve it by Computer, R.G.Dromey, Pearson Education.

Practical

- At least 20 Practical based on Syllabus of Paper-I and Paper-II.

INFORMATION TECHNOLOGY

PAPER - I

DIGITAL CIRCUITS & COMPUTER H/W

(Paper Code - 0874)

UNIT-I (A) Number Systems :

Octal and hexadecimal number, decimal rep., complements, addition, subtraction, multiplication, division, fixed point rep, floating point rep., other binary code-gray code, excess 3 gray, excess-3, 2421, etc. error detection code.

(B) Boolean Algebra :

Laws, demorgan's theorm, Simplification boolean expression & logic diagram, positive & negative logic, K-map and simplification of K-map.

UNIT-II Combinational circuits :

Half adder, full adder, flip-flop : SR, JK, D,T, sequential circuits : encoder, decoder, multiplexer, shift resister, binary counters, BCD adder.

UNIT-III Multivibrator circuits :

Monostable, astable, bistable, smitt trigger, clocked RS, master-slave flip-flop, edge triggered flip-flop, latch.

Intergrated circuits :

RTL, DITL, TTL, CMOS, MOS.

UNIT-IV (A) Central Processing Unit :

Introduction, register organisation, stack organisation, Instruction formats, Addressing modes.

(B) I/O organisatin :

I/O interfaces, Data transfer, types and modes, interrupts, DMA, IOP.

UNIT-V Memory organisation :

Memory hierarcy, main memory, Auxiliary memory, Associative memory, cache memory, virtual memory, memory management techniques.

REFERENCE TAXT BOOK :

1. Integrated Electronics — Millman & Halkias
2. Principle of Electronics — V.K. Mehta
3. Digital Electronics — R.P. Jain
4. Computer System Architecture — Morris Mano
5. Digital Electronics & Computer Hardware — Morris Mano

PAPER - II

(Paper Code - 0875)

UNIT-I Ingroduction to OPP : Advantages of OPP, the Object oriented approach, characteristics of object oriented languages : object, classes, inheritance, reusability, polymorphism and C++.

UNIT-II Function : function declaration, calling function, function definition, passing arguments to function, passing constant, passing value, fegerence argument, returning by reference, inline function, function overloading, default arguments in function.

UNIT-III Object and classes, using the classes, class constructor, class destructor, object as function argument, copy constructor, struct and classes, array as class member, static class data, static member functions, friend function, friend class, operator overloading, type of inheritance, bass class derive class, access percifier, protectedc, member function.

UNIT-IV Pointers : & and * operator pointer variables, pointer to pointer, void pointer, pointer and array, pointer and functions, pointer and string, memory management, new and delete, pointer to object, this pointer, virtual function : virtual function, virtual member function, accesses with pointer, pure virtual function.

UNIT-V File and stream : C++ steams, C++ manipulators, Stream class, string I/O, char I/O; object I/O, I/O with multiple objects, disk I/O.

REFERENCE TEXT BOOKS :

1.	Programming in C++	-	E. Balaguruswami
2.	Mastering in C++	-	Venu Gopal
3.	Object Oriented Programming in C++	-	Robert Lafore
4.	Let us C++	-	Y. Kanetkar

PRACTICAL WORK

1. The sufficient Practical work should be done for understanding the paper 2.

2. At least five programs on each unit from unit 2 to unit 5 be prepared.

3. All practical works should be prepared in form of print outs and be valuated while practical examination.

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INFORMATION TECHNOLOGIES

PAPER - I

(Paper Code-0928)

AMPLIFIERS AND OSCILLATORS

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 pushpull power amplifier, power and efficiency calculation for pushpull for pushpull power amplifier, Distortion in pushpull power amplifier, Advantages of pushpull power amplifier.

UNIT-II **FEEDBACK AMPLIFIERS AND OSCILLATORS :** Feedback in amplifiers, types of feedback positive, and negative feedback. Derivation of input and output impedance in voltage and current series feedback. Advantages of negative feedback. Positive feedback. Berkhauson criteria for sustained oscillator. RF oscillators-Hartley oscillatot, Colpetts oscillators (Qualitative study) relaxation oscillators, Multivibrators-Astable, Monostable.

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

UNIT-IV **THE INTEL 8080/8085 MICROPROCESSOR :** Introcution, 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 instructions the 8080/8085 stack, I/O and machine controlled instructions.

UNIT-V **PROGRAMMING THE MICROPROCESSOR :** Machine and assembling languages simplified instruction set, Instruction set, arithmetic poeration, Instructions set logical operations, instruction set data transfer operations, instruction set branch operations, instructuion set-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.

PAPER - II

(Paper Code-0929)

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 list of queues, Header nodes, 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 sort, Quick sort, Bubble sort, Heap sort, Comparison of sorting methods.

UNIT-V 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 spanning Tree, The basic, Greedy Strategy for computing Algorithm of Kruskal and prims.

TEXT & REFERENCE BOOK :

Fundamentals of Data structure : By S. Sawhney & Horowith

Data Structure : By Trembley & Sorrenson.

Data Structure Using Pascal : By Tannenbaum & Alugenstein

Data Structure : By lipschuists (Schaume's Outline Series Mcgraw Hill Publication)

Fundamentals of Computer Algorithm : By Ellis Horowitz and 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.

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B.Sc.-III

Meeting of Central Board of Studies(Chemistry): 18th June, 2018

Subject/ Faculty/ Name of Question Paper .... Chemistry/ Science ....

Existing Syllabus	New Modified Syllabus	Justification of New Modified Syllabus
B.Sc. PART-I **PAPER I (Inorganic Chem)** **Unit-I** (A: Atomic Structure) (B: Periodic Properties)	Fundamental particles removed. Atomic and ionic radii added. (Remaining part is same as existing)	Already there in Hr. Secondary syllabus To re-appropriate and updating. Unit-I, Part-B re-appropriated
Unit-II (Chemical Bonding)	No major changes compared to existing syllabus	
Unit-III (Chemical Bonding)	No major changes compared to existing syllabus	
Unit-IV (A: s-Block Elements) (B: Chemistry of Noble Gases)	Changed to- (A: s-Block Elements) (B: p-Block Elements)	'Oxidation Reduction' part moved to BSc-II. 'Acid and Bases' part moved to B.Sc-II in Part-A of Unit-V Changes have been made to maintain continuity in the topics
Unit-V (A. p-Block Elements) (B. Inorganic Chemical Analysis)	Changed into two parts as Part A- Chemistry of Noble Metals & Part B- Theoretical principles in Qualitative analysis	Reappropriation needed to strengthen the topic. Included because students do not practice much in Hr. Sec. level. (**Graphene** like **hot topic** is introduced)
Laboratory Course (**Semimicro Analysis**)	Splitted in 4 sections • Semimicro analysis • Acid-Base Titrations • Redox Titrations • Iodo/ Iodimetric Titrations	For developing enhanced experimental skills

(Signature of members of Central Board of Studies)

Meeting of Central Board of Studies(Chemistry): 18th June, 2018

Subject/ Faculty/ Name of Question Paper .... Chemistry/ Science ....

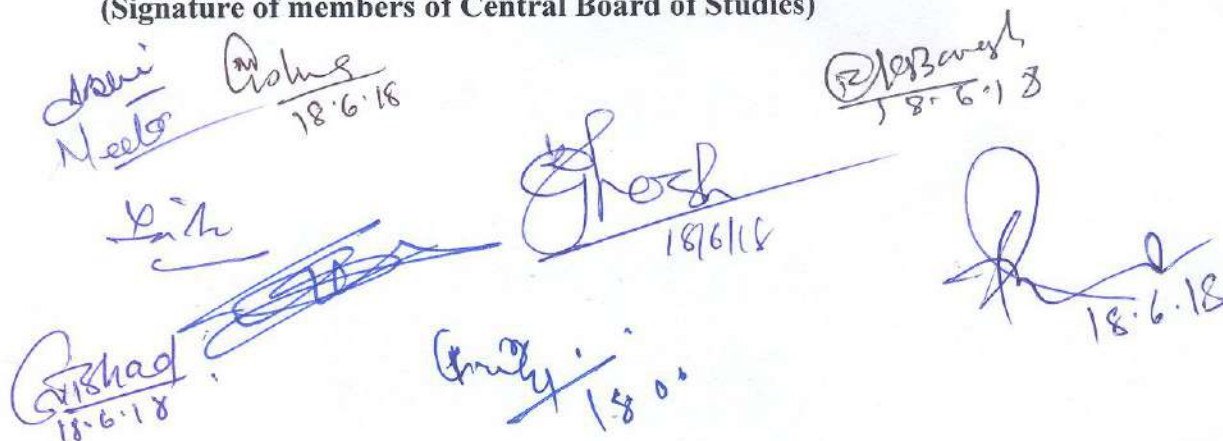| Existing Syllabus	New Modified Syllabus	Justification of New Modified Syllabus
B.Sc. PART-I **PAPER II (Organic Chem)**		
Unit-I **Basics of Organic Chemistry**	Added new topics- 'influence of hybridization on bond properties' & 'nitrenes'	Important topics, for upgradation
Unit-II **Introduction to Stereochemistry**	Added new topics- 'Newmann and Sawhorse Projection formulae and their inter-converstions	Important topics, for upgradation
Unit-III **Conformational Analysis of Alkanes**	Minor addition of topics (e.g. sugars and theory of strain rings)	for upgradation
Unit-IV **Aromatic Hydrocarbons**	No change, only reappropriation	-
Laboratory Course	No major changes in the existing syllabus	-

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Meeting of Central Board of Studies(Chemistry): 18th June, 2018

Subject/ Faculty/ Name of Question Paper .... Chemistry/Science ....

Existing Syllabus	New Modified Syllabus	Justification of New Modified Syllabus
B.Sc. PART-I **PAPER III (Physical Chem)** **Unit-I** **Mathematical Concepts for Chemists and Computers**	Computers part has been removed Added- Significant figures and their applications	Students learn now a day since primary classes. Important topic
Unit-II **Gaseous State**	No change	Appropriate
Unit-III **A. Liquid State** **B. Colloidal State**	Part B. changed to 'Colloids and Surface Chemistry*' (* brought from Unit IV of existing syllabus)	Reappropriation
Unit-IV **A. Solid State** **B. Surface Chemistry**	'Surface Chemistry' moved to Unit-III	Reappropriate
Unit-V **Chemical Kinetics**	'Complex reactions...side reactions' deleted	Less important
Laboratory Course	No drastic change made	Existing course structure is well organized

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Meeting of Central Board of Studies(Chemistry): 18th June, 2018

Subject/ Faculty/ Name of Question Paper ....Chemistry/Science...........

Existing Syllabus	New Modified Syllabus	Justification of New Modified Syllabus
B.Sc. PART-II **PAPER I (Inorganic Chem)**		
Unit-I **First transition series**	All d-block elements merged together. Now the title is 'Chemistry of Transition Series Elements'. In earlier syllabus this was divided in Unit-I & II.	Better composition
Unit-II **Second and third transition series**	Splitted to two parts. Part A- 'Oxidation and Reduction' Part B- 'Coordination Compounds'	Better composition
Unit-III **A. Oxidation and reduction** **B. Coordination Compounds**	Both moved to Unit II. A new topic 'Coordination Chemistry' is placed.	Better composition and upgradation
Unit-IV **A. Lanthenides** **B. Actinides**	Same as existing	
Unit-V **A. Acid and Bases** **B. Non-aqueous Solvents**	Same as existing. With addition of HF, H_2SO_4, Ionic liquids in Part B.	Modification/ upgradation
Laboratory Course **Calibration, standard solution** **Quantitative analysis by volumetric method** **Colorimetry, solvent extraction, ion exchange**	Changed to Advanced semimicro analysis Volumetric analysis Chromatographic separation of ions	Modification/ upgradation To make the syllabus more appropriate at this level

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Meeting of Central Board of Studies(Chemistry): 18th June, 2018

Subject/ Faculty/ Name of Question Paper ....

B.Sc. PART-II

PAPER-II(Organic Chem) Existing Syllabus	New Modified Syllabus	Justification of New Modified Syllabus
Unit-I **Alcohols** **Phenols** **Epoxides**	Changed to 'Organic Halides'. 'Alcohols and Phenols' moved to Unit-II. 'Epoxides' deleted	Important topic Reappropriation Less important topic
Unit-II **Aldehydes and Ketones**	Changed to 'Alcohols & Phenols' with inclusion of primary alcohols too.	Reappropriation and upgradation
Unit-III **A. Carboxylic Acids** **B. Substituted Carb. Acids** **C. Carboxylic & derivatives**	Changed to 'Aldehydes & Ketones' with little change in topics	Reappropriation
Unit-IV **Organic Compounds of Nitrogen**	Changed to 'A. Carboxylic Acids' and 'B. Carboxylic Acid Derivatives	Better composition
Unit-V **Heterocyclic Compounds**	Changed to 'Organic Compounds of Nitrogen'	Better composition
Laboratory Course **A. Thin layer chromatography** **B. Paper Chromatography:** **Ascending & Circular** **Qualitative Analysis of organic compounds**	Changed to: Detection of elements (X,N,S) Qualitative analysis of organic compounds (with enhanced list of compounds) Synthesis of organic compounds containing important and diffrent functional groups.	To develop synthetic skills and upgradation

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Meeting of Central Board of Studies(Chemistry): 18th June, 2018

Subject/ Faculty/ Name of Question Paper .... Chemistry/Science

Existing Syllabus	New Modified Syllabus	Justification of New Modified Syllabus
B.Sc. PART-II **PAPER III (Physical Chem)** **Unit-I** **A. Thermodynamics-I** **B. Thermochemistry**	Only minor changes in topic. Inclusion of topics on 'adiabatic flame temperature and explosion temperature'	Reappropriation For upgradation
Unit-II **Thermodynamics-II**	Inclusion of topics on 'Molecular and statistical interpretation of entropy', 'Maxwell relations, Elementary idea of Third law of Thermodynamics, concept of residual entropy, calculation of absolute entropy of molecule'	For upgradation
Unit-III **Phase Equilibrium**	Changed to 'Part A- Chemical Equilibrium' & 'Part B- Ionic Equilibria'. Phase equilibrium moved to Unit-IV	For upgradation
Unit-IV **Electrochemisty-I**	Changed to 'Phase Equilibrium'	Reappropriation.
Unit-V **Electrochemistry-II**	Changed to 'Photochemistry'	Upgradation
Laboratory Course **Transition temperature** **Phase equilibrium** **Thermochemistry** **Based experiments**	In addition to the existing course, a new experiment on molecular weight determination is introduced	Upgradation

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Meeting of Central Board of Studies(Chemistry): 18th June, 2018

Subject/ Faculty/ Name of Question Paper .... Chemistry/Science ....

Existing Syllabus	New Modified Syllabus	Justification of New Modified Syllabus
B.Sc. PART-III **PAPER I (Inorganic Chem)**		
Unit-I **Metal Ligand Bonding in Transition Metal Complexes**	Modified with inclusion of topics like 'Jahn Teller distortion in octahedral complexes'	Upgradation
Unit-II **Magnetic Properties of Transition Metal Complexes**	No Change	-
Unit-III **Organometallic Chemistry**	Drastic changes in the content (more than 60%). Added topics like 'Catalysis by organometallic compounds.	Upgradation
Unit-IV **Bioinorganic Chemistry**	No Change	-
Unit-V **Hard and Soft Acids and Bases (HSAB)**	Changed to 'Hard and Soft Acids and Bases' & 'Inorganic Polymers'	Change in nomenclature only
Laboratory Course **Experiments based on Synthesis of inorganic complexes and their analysis and gravimetric analysis of elements**	Gravimetric analysis list expanded with analysis of Aluminum with oxines. Expansion in list of synthesis of inorganic complexes	Upgradation

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Meeting of Central Board of Studies(Chemistry): 18th June, 2018

Subject/ Faculty/ Name of Question Paper ....Chemistry/Science.....

Existing Syllabus	New Modified Syllabus	Justification of New Modified Syllabus
B.Sc. PART-III **PAPER II (Organic Chem)** **Unit-I** **A. Organometallic Compounds** **B. Organosulphur Compounds** **Organic synthesis via Enolates**	Changed to 'Heterocyclic Compounds'	For upgradation.
Unit-II **Biomolecules (A: Carbohydrate; B: Protein & Nucleic acids)**	Changed to 'A. Organometallic Reagents' & 'B. Organic Synthesis via Enolates'	Modification/ reappropriation
Unit-III **A. Synthetic Polymers** **B. Synthetic Dyes**	Changed to 'Biomolecules' from Unit-II with change in Part B as 'Amino acids, Proteins & Nucleic Acid'	Upgradation/ reappropriation
Unit-IV **Spectroscopy (Mass, IR, UV-Vis)**	Changed to as Unit III of existing syllabus, i.e., A. Synthetic Polymers; B. Synthetic Dyes	Reappropriation
Unit-V **A. NMR; B. ^{13}CMR; MRI**	Changed to 'A. IR; B. UV-Vis; C. NMR'	Reappropriation
Laboratory Course **Synthesis of organic compounds**	Expansion in the list of compounds is made. Analysis and identification by different techniques added. Biomolecules analysis added.	Upgradation done.

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Meeting of Central Board of Studies(Chemistry): 18th June, 2018

Subject/ Faculty/ Name of Question Paper ....

Chemistry/Science

Existing Syllabus	New Modified Syllabus	Justification of New Modified Syllabus
B.Sc. PART-III **PAPER III (Physical Chem)**		
Unit-I **Quantum Mechanics-I**	Deleted 'De Broglie idea of matter waves, ... Sinusoidal wave equation'. (Remaining topics are not changed)	Already taught in earlier classes. Less important
Unit-II **Quantum Mechanics-II**	No change	-
Unit-III **Spectroscopy-I (A. Introduction; B. Vibrational Spectra; C. Raman Spectra)**	No change	-
Unit-IV **Spectroscopy-II** **(A. Electronic Spectra; B. Photochemistry)**	Changed to 'Electrochemistry-I'	Reappropriation
Unit-V **Thermodynamics**	Changed to 'Electrochemistry-II'	Reappropriation
Laboratory Course **Experiments based on Electrochemistry, Refractometry, Polarimetry, Molecular weight determination, Colorimetry**	Changed to experiments based techniques like Conductometry, pH and Potentiometry, and UV-Vis Spectroscopy	Upgradation done

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NEW CURRICULUM OF B.Sc. PART I

CHEMISTRY

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

PAPER I

INORGANIC CHEMISTRY

M.M.33

UNIT-I

A. ATOMIC STRUCTURE

Bohr's theory, its limitation and atomic spectrum of hydrogen atom. General idea of de-Broglie matter-waves, Heisenberg uncertainty principle, Schrödinger wave equation, significance of Ψ and Ψ^2, radial & angular wave functions and probability distribution curves, quantum numbers, Atomic orbital and shapes of s, p, d orbitals, Aufbau and Pauli exclusion principles, Hund's Multiplicity rule, electronic configuration of the elements.

B. PERIODIC PROPERTIES

Detailed discussion of the following periodic properties of the elements, with reference to s and p-block. Trends in periodic table and applications in predicting and explaining the chemical behavior.

a) Atomic and ionic radii,

b) Ionization enthalpy,

c) Electron gain enthalpy,

d) Electronegativity, Pauling's, Mulliken's, Allred Rochow's scales.

e) Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table.

UNIT-II

CHEMICAL BONDING I

Ionic bond: Ionic Solids - Ionic structures, radius ratio & co-ordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy Born- Haber cycle, Solvation

energy and solubility of ionic solids, polarising power & polarisabilitry of ions, Fajans rule, Ionic character in covalent compounds: Bond moment and dipole moment, Percentage ionic character from dipole moment and electronegatiity difference, Metallic bond-free electron, Valence bond & band theories.

UNIT-III
CHEMICALBONDING II

Covalent bond: Lewis structure, Valence bond theory and its limitations, Concept of hybridization, Energetics of hybridization, equivalent and non-equivalent hybrid orbitals. Valence shell electron pair repulsion theory (VSEPR), shapes of the following simple molecules and ions containing lone pairs and bond pairs of electrons: H_2O, NH_3, PCl_3, PCl_5, SF_6. H_3O^+, SF_4, ClF_3, and ICl_2^- Molecular orbital theory. Bond order and bond strength, Molecular orbital diagrams of diatomic and simple polyatomic molecules N_2, O_2, F_2, CO, NO.

UNIT-IV
A. s-BLOCK ELEMENTS
General concepts on group relationships and gradation properties, Comparative study, salient features of hydrides, solvation & complexation tendencies including their function in biosystems and introduction to alkyl & aryls, Derivatives of alkali and alkaline earth metals

B. p-BLOCK ELEMENTS

General concepts on group relationships and gradation properties. Halides, hydrides, oxides and oxyacids of Boron, Aluminum, Nitrogen and Phosphorus. Boranes, borazines, fullerenes, graphene and silicates, interhalogens and pseudohalogens.

UNIT-V

A CHEMISTRY OF NOBLE GASES

Chemical properties of the noble gases, chemistry of xenon, structure, bonding in xenon compounds

B. THEORETICAL PRINCIPLES IN QUALITATIVE ANALYSIS (H_2S SCHEME)

Basic principles involved in the analysis of cations and anions and solubility products, common ion effect. Principles involved in separation of cations into groups and choice of group reagents. Interfering anions (fluoride, borate, oxalate and phosphate) and need to remove them after Group II.

REFERENCE BOOKS:

1. Lee, J. D. Concise Inorganic Chemistry ELBS, 1991.
2. Douglas, B.E. and McDaniel, D.H. Concepts & Models of Inorganic Chemistry Oxford, 1970
3. Atkins, P.W. & Paula, J. Physical Chemistry, 10th Ed., Oxford University Press, 2014.
4. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications, 1962.
5. Rodger, G.E. Inorganic and Solid State Chemistry, Cengage Learning India Edition, 2002.
6. Puri, B. R., Sharma, L. R. and Kalia, K. C., Principles of Inorganic Chemistry, Milestone Publishers/ Vishal Publishing Co.; 33rd Edition 2016
7. Madan, R. D. Modern Inorganic Chemistry, S Chand Publishing, 1987.

PAPER: II

ORGANIC CHEMISTRY

UNIT-I   BASICS OF ORGANIC CHEMISTRY

Hybridization, Shapes of molecules, Influence of hybridization on bond properties. Electronic Displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications; Dipole moment. Electrophiles and Nucleophiles; Nucleophilicity and basicity; Homolytic and Heterolytic cleavage, Generation, shape and relative stability of Carbocations, Carbanions, Free radicals, Carbenes and Nitrenes. Introduction to types of organic reactions: Addition, Elimination and Substitution reactions.

UNIT-II   INTRODUCTION TO STEREOCHEMISTRY

Optical Isomerism: Optical Activity, Specific Rotation, Chirality/Asymmetry, Enantiomers, Molecules with two or more chiral-centres, Diastereoisomers, meso compounds, Relative and absolute configuration: Fischer, Newmann and Sawhorse Projection formulae and their interconversions; Erythrose and threose, D/L, d/l system of nomenclature, Cahn-Ingold-Prelog system of nomenclature (C.I.P rules), R/S nomenclature. Geometrical isomerism: cis–trans, syn-anti and E/Z notations.

UNIT-III   CONFORMATIONAL ANALYSIS OF ALKANES

Conformational analysis of alkanes, ethane, butane, cyclohexane and sugars. Relative stability and Energy diagrams. Types of cycloalkanes and their relative stability, Baeyer strain theory: Theory of strainless rings, Chair, Boat and Twist boat conformation of cyclohexane with energy diagrams; Relative stability of mono-substituted cycloalkanes and disubstituted cyclohexane.

UNIT-IV   CHEMISTRY OF ALIPHATIC HYDROCARBONS

A. Carbon-Carbon sigma (σ) bonds

Chemistry of alkanes: Formation of alkanes, Wurtz Reaction, Wurtz-Fittig Reaction, Free radical substitutions: Halogenation-relative reactivity and selectivity.

B. **Carbon-Carbon Pi (л) bonds**:

Formation of alkenes and alkynes by elimination reactions, Mechanism of E1, E2, E1cb reactions. Saytzeff and Hofmann eliminations.

Reactions of alkenes: Electrophilic additions and mechanisms (Markownikoff/ Anti - Markownikoff addition), mechanism of oxymercuration-demercuration, hydroboration-oxidation, ozonolysis, reduction (catalytic and chemical), syn and anti-hydroxylation (oxidation). 1,2-and 1,4-addition reactions in conjugated dienes and, Diels-Alder reaction; Allylic and benzylic bromination and mechanism, e.g. propene, 1-butene, toluene, ethyl benzene.

Reactions of alkynes: Acidity, Electrophilic and Nucleophilic additions. Hydration to form carbonyl compounds, Alkylation of terminal alkynes.

UNIT-V   AROMATIC HYDROCARBONS

Aromaticity: Hückel's rule, aromatic character of arenes, cyclic carbocations/ carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft's alkylation/acylation with their mechanism. Directive effects of the groups.

REFERENCE BOOKS:

1. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd.(Pearson Education).
2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Eliel, E. L. &Wilen, S. H. Stereochemistry of Organic Compounds, Wiley: London, 1994.

5. Kalsi, P. S. Stereochemistry Conformation and Mechanism, New Age International, 2005.

6. McMurry, J.E. Fundamentals of Organic Chemistry, 7th Ed. Cengage Learning India Edition, 2013.

7. Organic Chemistry, Paula Y. Bruice, 2nd Edition, Prentice-Hall, International Edition (1998).

8. A Guide Book of Reaction Mechanism by Peter Sykes.

PAPER - III

PHYSICAL CHEMISTRY   M.M.34

UNIT-I

MATHEMATICAL CONCEPTS FOR CHEMIST

Basic Mathematical Concepts: Logarithmic relations, curve sketching, linear graphs, Properties of straight line, slope and intercept, Functions, Differentiation of functions, maxima and minima; integrals; ordinary differential equations; vectors and matrices; determinants; Permutation and combination and probability theory, Significant figures and their applications.

UNIT-II

GASEOUS STATE CHEMISTRY

Kinetic molecular model of a gas: postulates and derivation of the kinetic gas equation; collision frequency; collision diameter; mean free path; Maxwell distribution and its use in evaluating molecular velocities (average, root mean square and most probable) and average kinetic energy, law of equipartition of energy, degrees of freedom and molecular basis of heat capacities. Joule Thompson effect, Liquification of Gases.

Behaviour of real gases: Deviations from ideal gas behaviour, compressibility factor (Z), and its variation with pressure and temperature for different gases. Causes of deviation from ideal behaviour. van der Waals equation of state, its derivation and application in explaining real gas behaviour, calculation of Boyle temperature. Isotherms of real gases and their comparison with van der Waals isotherms, continuity of states, critical state, relation between critical constants and van der Waals constants, law of corresponding states.

UNIT-III

A.   LIQUID STATE CHEMISTRY

Intermolecular forces, magnitude of intermolecular force, structure of liquids, Properties of liquids, viscosity and surface tension.

B.   COLLOIDS and SURFACE CHEMISTRY

Classification, Optical, Kinetic and Electrical Properties of colloids, Coagulation, Hardy Schulze law, flocculation value, Protection, Gold number, Emulsion, micelles and types, Gel, Syneresis and thixotrophy, Application of colloids.

Physical adsorption, chemisorption, adsorption isotherms (Langmuir and Freundlich). Nature of adsorbed state. Qualitative discussion of BET.

UNIT-IV

SOLID STATE CHEMISTRY

Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, qualitative idea of point and space groups, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, a simple account of rotating crystal method and powder pattern method. Crystal defects.

UNIT-V

A. CHEMICAL KINETICS

Rate of reaction, Factors influencing rate of reaction, rate law, rate constant, Order and molecularity of reactions, rate determining step, Zero, First and Second order reactions, Rate and Rate Law, methods of determining order of reaction, Chain reactions.

Temperature dependence of reaction rate, Arrhenius theory, Physical significance of Activation energy, collision theory, demerits of collision theory, non mathematical concept of transition state theory.

B. CATALYSIS

Homogeneous and Heterogeneous Catalysis, types of catalyst, characteristic of catalyst, Enzyme catatysed reactions, Micellar catatysed reactions, Industrial applications of Catalysis.

REFERENCE BOOKS:

1. Atkins, P. W. & Paula, J. de Atkin's Physical Chemistry 10th Ed., Oxford University
    Press (2014).

2. Ball, D. W. Physical Chemistry Thomson Press, India (2007).

3. Castellan, G. W. Physical Chemistry 4th Ed. Narosa (2004).

4. Mortimer, R. G. Physical Chemistry 3rd Ed. Elsevier: NOIDA, UP (2009).

5. Engel, T. & Reid, P. Physical Chemistry 3rd Ed. Pearson (2013).

6. Puri, B.R., Sharma, L. R. and Pathania, M.S., Principles of Physical Chemistry, Vishal Publishing Co., 47th Ed. (2016).

7. Bahl, A., Bahl, B.S. and Tuli, G.D. Essentials of Physical Chemistry, S Chand Publishers (2010).

8. Rakshit P.C., Physical Chemistry, Sarat Book House Ed. (2014).

9. Singh B., Mathematics for Chemist, Pragati Publications.

PAPER - IV
LABOBATORY COURSE

INORGANIC CHEMISTRY

A. Semi-micro qualitative analysis (using H_2S or other methods) of mixtures - not more than four ionic species (two anions and two cations, excluding interfering, insoluble salts) out of the following:

Cations : NH_4^+, Pb^{2+}, Bi^{3+}, Cu^{2+}, Cd^{2+}, Fe^{3+}, Al^{3+}, Co^{2+}, Ni^{2+}, Mn^{2+}, Zn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, Na^+

Anions : CO_3^{2-}, S^{2-}, SO_3^{2-}, $S_2O_3^{2-}$, NO_2^-, CH_3COO^-, Cl^-, Br^-, I^-, NO_3^-, SO_4^{2-}

(Spot tests may be carried out wherever feasible)

B. Acid-Base Titrations

- Standardization of sodium hydroxide by oxalic acid solution.
- Determination of strength of HCl solution using sodium hydroxide as intermediate.
- Estimation of carbonate and hydroxide present together in mixture.
- Estimation of carbonate and bicarbonate present together in a mixture.
- Estimation of free alkali present in different soaps/detergents

C. Redox Titrations

- Standardization of $KMnO_4$ by oxalic acid solution.
- Estimation of Fe(II) using standardized $KMnO_4$ solution.
- Estimation of oxalic acid and sodium oxalate in a given mixture.
- Estimation of Fe(II) with $K_2Cr_2O_7$ using internal (diphenylamine, anthranilic acid) and external indicator.

D. Iodo / Iodimetric Titrations

- Estimation of Cu(II) and $K_2Cr_2O_7$ using sodium thiosulphate solution iodimetrically.
- Estimation of (a) arsenite and (b) antimony iodimetrically.

- Estimation of available chlorine in bleaching powder iodometrically.
- Estimation of Copper and Iron in mixture by standard solution of $K_2Cr_2O_7$ using sodium thiosulphate solution as titrants.

ORGANIC CHEMISTRY

1. Demonstration of laboratory Glasswares and Equipments.
2. Calibration of the thermometer. 80°–82° (Naphthalene), 113.5^o–114° (Acetanilide), 132.5^o-133° (Urea), 100° (Distilled Water).)

3. Purification of organic compounds by crystallization using different solvents.

   - Phthalic acid from hot water (using fluted filter paper and stemless funnel).
   - Acetanilide from boiling water.
   - Naphthalene from ethanol.
   - Benzoic acid from water.
4. Determination of the melting points of organic compounds.

   Naphthalene 80°–82°, Benzoic acid 121.5^o–122°, Urea 132.5^o–133° Succinic acid 184.5^o–185°, Cinnamic acid 132.5^o–133°, Salicylic acid 157.5^o–158°, Acetanilide 113.5^o–114°, m-Dinitrobenzene 90°, p-Dichlorobenzene 52°, Aspirin 135°.

5. Effect of impurities on the melting point – mixed melting point of two unknown organic compounds.

   - Urea – Cinnamic acid mixture of various compositions (1:4, 1:1, 4:1).
6. Determination of boiling point of liquid compounds. (boiling point lower than and more than 100 °C by distillation and capillary method).

   - Ethanol 78°, Cyclohexane 81.4^o, Toluene 110.6^o, Benzene 80°.
   i. Distillation (Demonstration)

      - Simple distillation of ethanol-water mixture using water condenser.
      - Distillation of nitrobenzene and aniline using air condenser.
   ii. Sublimation

      - Camphor, Naphthalene, Phthalic acid and Succinic acid.
   iii. Decolorisation and crystallization using charcoal.

      - Decolorisation of brown sugar with animal charcoal using gravity filtrations crystallization and decolorisation of impure naphthalene (100 g of naphthalene mixed with 0.3 g of Congo red using 1 g of decolorizing carbon) from ethanol.
7. Qualitative Analysis

Detection of elements (N, S and halogens) and functional groups (Phenolic, Carboxylic, CarbonyI, Esters, Carbohydrates, Amines, Amides, Nitro and Anilide) in simple organic compounds.

PHYSICAL CHEMISTRY

1. Surface tension measurements.

   - Determine the surface tension by (i) drop number (ii) drop weight method.
   - Surface tension composition curve for a binary liquid mixture.

2. Viscosity measurement using Ostwald's viscometer.

   - Determination of viscosity of aqueous solutions of (i) sugar (ii) ethanol at room temperature.
   - Study of the variation of viscosity of sucrose solution with the concentration of solute.
   - Viscosity Composition curve for a binary liquid mixture.

3. Chemical Kinetics

   - To determine the specific rate of hydrolysis of methyl/ethyl acetate catalysed by hydrogen ions at room temperature.
   - To study the effect of acid strength on the hydrolysis of an ester.
   - To compare the strengths of HCl & H_2SO_4 by studying the kinetics of hydrolysis of ethyl acetate.

4. Colloids

   - To prepare colloidal solution of silver nanoparticles (reduction method) and other metal nanoparticles using capping agents.

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

PRACTICAL EXAMINATION

05 Hrs.
M.M. 50

Three experiments are to be performed

1. Inorganic Mixture Analysis, four radicals two basic & two acid (excluding insoluble, Interfering & combination of acid radicals) OR Two Titrations (Acid-Bases,Redox and Iodo/Iodimetry)

12 marks

2. Detection of functional group in the given organic compound and determine its MPt/BPt.

8 marks

O R

Crystallization of any one compound as given in the prospectus along with the determination of mixed MPt.

O R

Decolorisation of brown sugar along with sublimation of camphor/ Naphthlene.

3. Any one physical experiment that can be completed in two hours including calculations.

14 marks

4. Viva   **10 marks**

5. Sessionals   **06 marks**

In case of Ex-Students two marks will be added to each of the experiments

REFERENCE TEXT:

1. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson, 2009.
2. Ahluwalia, V. K., Dhingra, S. and Gulati, A. College practical Chemistry, University Press.
3. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
4. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)
5. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).
6. Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry 8th Ed.; McGraw-Hill: New York (2003).
7. Halpern, A. M. & McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co.: New York (2003).

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NEW CURRICULUM OF B.Sc. PART II

CHEMISTRY

</div>

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.

<div align="center">

Paper – I
INORGANIC CHEMISTRY   **60 Hrs., Max Marks 33**

</div>

UNIT-I

CHEMISTRY OF TRANSITION SERIES ELEMENTS

Transition Elements: Position in periodic table, electronic configuration, General Characteristics, *viz*., atomic and ionic radii, variable oxidation states, ability to form complexes, formation of coloured ions, magnetic moment μ_{so} (spin only) and μ_{eff} and catalytic behaviour. General comparative treatment of 4d and 5d elements with their 3d analogues with respect to ionic radii, oxidation states and magnetic properties.

UNIT-II

A. Oxidation and Reduction: Redox potential, electrochemical series and its applications, Principles involved in extraction of the elements.

B. COORDINATION COMPOUNDS: Werner's theory and its experimental verification, IUPAC nomenclature of coordination compounds, isomerism in coordination compounds. Stereochemistry of complexes with 4 and 6 coordination numbers. Chelates, polynuclear complexes.

UNIT-III

COORDINATION CHEMISTRY

Valence bond theory (inner and outer orbital complexes), electroneutrality principle and back bonding. Crystal field theory, Crystal field splitting and stabilization energy, measurement of 10 Dq (Δ_o), CFSE in weak and strong fields, pairing energies, factors affecting the magnitude of 10 Dq (Δ_o, Δ_t). Octahedral vs. tetrahedral coordination.

UNIT-IV

A. CHEMISTRY OF LANTHANIDE ELEMENTS

Electronic structure, oxidation states and ionic radii and lanthanide contraction, complex formation, occurrence and isolation, lanthanide compounds.

B. CHEMISTRY OF ACTINIDES

General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from uranium, similarities between the later actinides and the later lanthanides

UNIT-V

A. ACIDS BASES : Arrhenius, Bronsted-Lowry, conjugate acids and bases, relative strengths of acids and bases, the Lux-flood, solvent system and Lewis concepts of acids and bases.

B. NON-AQUEOUS SOLVENTS

.Physical properties of a solvent, types of solvents and their general characteristics, reaction in non-aqueous solvents with reference to liquid ammonia and liquid sulphur dioxide, HF, H_2SO_4 , Ionic liquids.

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.

UNIT-I

CHEMISTRY OF ORGANIC HALIDES

Alkyl halides: Methods of preparation, nucleophilic substitution reactions – S_N1, S_N2 and S_N^i mechanisms with stereochemical aspects and effect of solvent etc.; nucleophilic substitution, elimination reactions.

Aryl halides: Preparation, including preparation from diazonium salts, Nucleophilic Aromatic Substitution; SNAr, Benzyne mechanism. Relative reactivity of alkyl, allyl/benzyl, vinyl and aryl halides towards nucleophilic substitution reactions.

UNIT-II

ALCOHOLS
A. Alcohols: Nomenclature, preparation, properties and relative reactivity of 1°, 2°, 3° alcohols, Bouvaelt-Blanc Reduction for the preparation of alcohols, Dihydric alcohols – methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [$Pb(OAc)_4$ and HIO_4] and pinacol-pinacolone rearrangement.

B. Trihydric alcohols - Nomenclature, methods of formation, chemical reactions of glycerol.

PHENOLS
A. Structure and bonding in phenols, physical properties and acidic character, Comparative acidic strength of alcohols and phenols, acylation and carboxylation.

B. Mechanism of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Hauben-Hoesh reaction, Lederer-Manasse reaction and Reimer-Tiemann reaction.

UNIT-III

ALDEHYDES AND KETONES

A. Nomenclature, structure and reactivity of carbonyl group. General methods of preparation of aldehydes and ketones.

Mechanism of nucleophilic addition to carbonyl groups: Benzoin, Aldol, Perkin and Knoevenagel condensation. Condensation with ammonia and its derivatives, Wittig reaction, Mannich reaction, Beckmann and Benzil- Benzilic rearrangement.

B. Use of acetate as protecting group, Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro reaction, MPV, Clemmensen reduction, Wolf-Kishner reaction, $LiAlH_4$ and $NaBH_4$ reduction. Halogenation of enolizable ketones, An introduction to α,β-unsaturated aldehydes and

ketones.

UNIT-IV

A. CARBOXYLIC ACIDS

Preparation, Structure and bonding, Physical and chemical properties including, acidity of carboxylic acids, effects of substituents on acid strength, Hell-Volhard Zeilinsky reaction. Reduction of carboxylic groups, Mechanism of decarboxylation.

Di carboxylic acids: Methods of formation and effect of heat and dehydrating agents, Hydroxyacids.

B. CARBOXYLIC ACID DERIVATIVES

Structure of acid chlorides, esters, amides and acid anhydrides, Relative stability of acyl derivatives. Physical properties, inter-conversion of acid derivatives by nucleophilic acyl substitution.

Mechanism of acid and base catalyzed esterification and hydrolysis.

UNIT-V

ORGANIC COMPOUNDS OF NITROGEN

A. Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes. Mechanism of nucleophilic substitution in nitroarenes and their reduction in acidic, neutral and alkaline medium.

B. Reactivity, structure and nomenclature of amines, physical properties. Stereochemistry of amines. Separation of mixture of primary, secondary and tertiary amines. Structural features affecting basicity of amines. Preparation of alkyl and aryl amines (reduction of nitro compounds and nitriles), reductive amination of aldehydic and ketonic compounds. Gabriel-Phthalimide reaction, Hofmann-Bromamide reaction, Reactions of amines, electrophilic aromatic substitution of aryl amines, Reaction of amines with nitrous acid. Synthetic transformations of aryl diazonium salts, Azo coupling.

REFERENCE BOOKS

1. Organic Chemistry, Morrison and Boyd, Prentice-Hall.
2. Organic Chemistry, L. G. Wade Jr. Prentice Hall.
3. Fundamentals of Organic Chemistry, Solomons, 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. Organic Chemistry, P. L. Soni.

8. Organic Chemistry, Bahl and Bahl.

9. Organic Chemistry, Joginder Singh.

10. Carbanic Rasayan, Bahl and Bahl.

11. Carbanic Rasayan, R. N. Singh, S. M. I. Gupta, M. M. Bakidia & S. K. Wadhwa.

12. Carbanic Rasayan, Joginder Singh.

Paper – III
PHYSICAL CHEMISTRY   60 Hrs., Max Marks 34

UNIT-I

A. THERMODYNAMICS-I

Intensive and extensive variables; state and path functions; isolated, closed and open systems; Zeroth law of thermodynamics. First law: Concept of heat, work, internal energy and statement of first law; enthalpy, Relation between heat capacities, calculations of q, w, U and H for reversible, irreversible and free expansion of gases under isothermal and adiabatic conditions. Joule-Thompson expansion, inversion temperature of gases, expansion of ideal gases under isothermal and adiabatic condition

B. THERMO CHEMISTRY

Thermochemistry, Laws of Thermochemistry, Heats of reactions, standard states; enthalpy of formation of molecules and ions and enthalpy of combustion and its applications; calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data, effect of temperature (Kirchhoff's equations) and pressure on enthalpy of reactions, Adiabatic flame temperature, explosion temperature.

UNIT-II

A. THERMODYNAMICS-II

Second Law of Thermodynamics: Spontaneous process, Second law, Statement of Carnot cycle and efficiency of heat engine, Carnot's theorem, thermodynamic state of temperature. Concept of entropy: Entropy change in a reversible and irreversible process, entropy change in isothermal reversible expansion of an ideal gas, entropy change in isothermal mixing of ideal gases, physical signification of entropy, Molecular and statistical interpretation of entropy.

B. Gibbs and Helmholtz free energy, variation of G and A with pressure, volume, temperature, Gibbs-Helmholtz equation, Maxwell relations, Elementary idea of Third law of Thermodynamics, concept of residual entropy, calculation of absolute entropy of molecule.

UNIT III

A CHEMICAL EQUILIBRIUM

Criteria of thermodynamic equilibrium, degree of advancement of reaction, chemical equilibria in ideal gases. Concept of Fugacity, Thermodynamic derivation of relation between Gibbs free energy of reaction and reaction quotient. Coupling of exergonic and endergonic reactions. Equilibrium constants and their quantitative dependence on temperature, pressure and concentration. Thermodynamic derivation of relations between the various equilibrium constants K_p, K_c and K_x. Le Chatelier principle (quantitative treatment). Equilibrium between ideal gas and a pure condensed phase.

B IONIC EQUILIBRIA

Ionization of weak acids and bases, pH scale, common ion effect; dissociation constants of mono protic acids (exact treatment). Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions; derivation of Henderson equation and its applications. Solubility and solubility product of sparingly soluble salts – applications of solubility product principle.

UNIT-IV

PHASE EQUILIBRIUM

A. Phase rule, Phase, component and degree of freedom, derivation of Gibbs phase rule, Clausius-Claperon equation and its applications to Solid-Liquid, Liquid-Vapor and solid-Vapor, limitation of phase rule, applications of phase rule to one component system: Water system and sulphur system.

Application of phase rule to two component system: Pb-Ag system, desilverization of lead, Zn-Mg system Ferric chloride-water system, congruent and incongruent, melting point and eutectic point.

Three component system: Solid solution liquid pairs.

B. Nernst distribution law, Henry's law, application, solvent extraction

UNIT V

PHOTOCHEMISTRY

Characteristics of electromagnetic radiation, Interaction of radiation with matter, difference between thermal and photochemical processes, Lambert-Beer's law and its limitations, physical significance of absorption coefficients. Laws of photochemistry: Grothus-Drapper law, Stark-Einstein law, quantum yield, actinometry, examples of low and high quantum yields, Photochemical equilibrium and the differential rate of photochemical reactions, Quenching, Role of photochemical reaction in biochemical process.

Jablonski diagram depicting various process occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), photosensitized reactions, energy transfer processes {simple examples), photostationary states, Chemiluminescence.

REFERENCE BOOKS

1. Physical Chemistry, G. M. Barrow, International student edition, McGraw Hill.
2. University General Chemistry, C. N. R. Rao, Macmillan.
3. Physical Chemistry, R. A. Alberty, Wiley Eastern.
4. The elements of physical chemistry, Wiley Eastern.
5. Physical Chemistry through problems, S. K. Dogra & S. Dogra, Wiley Eastern.
6. Physical Chemistry, B. D. Khosla,.
7. Physical Chemistry, Puri & Sharma.
8. Bhautik Rasayan, Puri, Sharma and Pathania, Vishal Publishing Company.
9. Bhautik Rasayan, P. L. Soni.
10. Bhautik Rasayan, Bahl and Tuli.
11. Physical Chemistry, R. L. Kapoor, Vol I-IV **.**
12. Chemical kinetics, K. J. Laidler, Pearson Educations, New Delhi (2004).

Paper –IV

LABORATORY COURSE

INORGANIC CHEMISTRY
Qualitative semimicro analysis of mixtures containing 5 radicals. Emphasis should be given to the understanding of the chemistry of different reactions. The following radicals are suggested:

CO_3^{2-}, NO_2^-, S^{2-}, SO_3^{2-}, $S_2O_3^{2-}$, CH_3COO^-, F^-, Cl^-, Br^-, I^-, NO_3^-, BO_3^{3-}, $C_2O_4^{2-}$, PO_4^{3-}, NH_4^+, K^+, Pb^{2+}, Cu^{2+}, Cd^{2+}, Bi^{3+}, Sn^{2+}, Sb^{3+}, Fe^{3+}, Al^{3+}, Cr^{3+}, Zn^{2+}, Mn^{2+}, Co^{2+}, Ni^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, Mg^{2+}.

Mixtures should preferably contain one interfering anion, or insoluble component ($BaSO_4$, $SrSO_4$, $PbSO_4$, CaF_2 or Al_2O_3) or combination of anions e.g. CO_3^{2-} and SO_3^{2-}, NO_2^- and NO_3^-, Cl^-, Br^-, and I^-.

 Volumetric analysis

(a)   Determination of acetic acid in commercial vinegar using NaOH.

(b)   Determination of alkali content-antacid tablet using HCl.

(c)   Estimation of calcium content in chalk as calcium oxalate by permanganometry.

(d)   Estimation of hardness of water by EDTA.

(e)   Estimation of ferrous & ferric by dichromate method.

(f)   Estimation of copper using thiosulphate.

- Principles involved in chromatographic separations. Paper chromatographic separation of following metal ions: i. Ni (II) and Co (II) ii. Fe (III) and Al (III)

ORGANIC CHEMISTRY

- Detection of elements (X, N, S).
- Qualitative analysis of unknown organic compounds containing simple functional groups (alcohols, carboxylic acids, phenols, nitro, amine, amide, and carbonyl compounds, carbohydrates)
- Preparation of Organic Compounds:

  (i) m-dinitrobenzene, (ii) Acetanilide, (iii) Bromo/Nitro-acetanilide, (iv) Oxidation of primary alcohols-Benzoic acid from benzylacohol, (v) azo dye.

PHYSICAL CHEMISTRY

Transition Temperature

- Determination of the transition temperature of the given substance by thermometric/ dialometric method (e.g. $MnCl_2.4H_2O/SrBr_2.2H_2O$).

Thermochemistry

- Determination of heat capacity of a calorimeter for different volumes using change of enthalpy data of a known system (method of back calculation of heat capacity of calorimeter from known enthalpy of solution or enthalpy of neutralization).
- Determination of heat capacity of the calorimeter and enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
- To determine the solubility of benzoic acid at different temperature and to determine ΔH of the dissolution process.
- To determine the enthalpy of neutralization of a weak acid/ weak base versus strong base/ strong acid and determine the enthalpy of ionization of the weak acid/ weak base.
- To determine the enthalpy of solution of solid calcium chloride and calculate the lattice energy of calcium chloride from its enthalpy data using Born Haber cycle.

Phase Equilibrium

- To study the effect of a solute (e.g. NaCl, Succinic acid) on the critical solution temperature of two partially miscible liquids (e.g. phenol-water system) and to determine the concentration of that solute in the given phenol-water system.
- To construct the phase diagram of two component system (e.g. diphenylamine–benzophenone) by cooling curve method.
- Distribution of acetic/ benzoic acid between water and cyclohexane.
- Study the equilibrium of at least one of the following reactions by the distribution method:

  (i) $I_2(aq) + I^- \rightarrow I^-_3 (aq)^{2+}$

  (ii) $Cu^{2+}(aq) + nNH_3 \rightarrow Cu(NH_3)n$
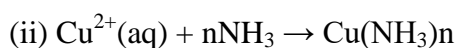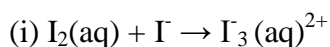
Molecular Weight Determination

Determination of molecular weight by Rast Camphor and Landsburger method.

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

Reference Books

1. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
2. Furniss, B.S., Hannaford, A.J., Smith, P.W.G. & Tatchell, A.R. Practical Organic Chemistry, 5th Ed. Pearson (2012)
3. Ahluwalia, V.K. & Aggarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000). 22
4. Ahluwalia, V.K. & Dhingra, S. Comprehensive Practical Organic Chemistry: Qualitative Analysis, University Press (2000).
5. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011). Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry 8th Ed.; McGraw-Hill: New York (2003).
6. Halpern, A. M. & McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co.: New York

Hrs.5   PRACTICAL EXAMINATION   M.M.50

Three Experiments are to be performed.

1. Inorganic – Qualitative semimicro analysis of mixtures.   **12 marks**

OR

One experiment from synthesis and analysis by preparing the standard solution.

2.   (a) Identification of the given organic compound & determine its M.Pt./B.Pt.

6 marks

   (b)   Determination of Rf value and identification of organic compounds by paper chromatography.   **6 marks**

3. Any one physical experiment that can be completed in two hours including calculations.

12 marks

4. Viva   **10 marks**

5. Sessional   **04 marks**

In case of Ex-Students one marks will be added to each of the experiment.

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 Ligand 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), Zeise'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.

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 λ_{max}, Chromophores and Auxochromes, Bathochromic 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, Solomons, 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.

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Paper – III
PHYSICAL CHEMISTRY   60 Hrs., Max Marks 34

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UNIT-I
QUANTUM MECHANICS–I

Black-body radiation, Planck's radiation law, photoelectric effect, Compton effect. Operator: Hamiltonian operator, angular momentum operator, Laplacian operator, postulate of quantum mechanics, eigen values, eigen function, Schrodinger time independent wave equation, physical significance of ψ & ψ^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 antibonding wave functions, Concept of σ, σ^*, π, π^* orbitals and their characteristics, Hybrid orbitals-sp,sp^2,sp^3 Calculation of coefficients of A.O.'s used in these hybrid orbitals.

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.

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

Raman spectrum: Concept of polarizability, quantum theory of Raman spectra, stokes and antistokes lines, pure rotational and pure vibrational 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 ΔG, ΔH and ΔS 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 valency 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.Alberty, Wiley Eastrn.

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.

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B.Sc. Part- III

PRACTICAL

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Max. Marks-50

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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 oxine and weighing as $Al(oxine)_3$ (aluminium oxinate).
- Estimation of Barium as $BaSO_4$

Inorganic Preparations:
- Tetraamminecopper (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

- Acetylation 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 Schotten-Baumann reaction.
- Bromination of any one of the following: a. Acetanilide by conventional methods b.Acetanilide using green approach (Bromate-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 glycine by Sorenson's formalin method.

7. Study of the titration curve of glycine.

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 conductometric 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 conductometrically using standard alkali solution.
- To determine the solubility and solubility product of a sparingly soluble electrolyte conductometrically
- To study the saponification of ethyl acetate conductometrically.

Potentiometry/pH metry

Perform the following potentio/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 propanone 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, acelaldehyde, acetic acid, etc.) in water.
- Absorption spectra of $KMnO_4$ and $K_2Cr_2O_7$ (in 0.1 M H_2SO_4) and determine λ_{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. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)
4. Ahluwalia, V.K. & Aggarwal, 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.

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. (Home-Science) PART- I

MARKING SCHEME

S.No.	Paper No.	Subject	Theory M. Mark	Practical M. Mark	Total	Theory M. Mark	Practical M.Mark
Group I	(A) (B)	Environmental Studies Field work **Foundation Course**	75 25	-	100	33	
	(A) (B)	Hindi Language-I English Language-II	75 75		75 75	26 26	
Group II	(A) (B)	Basic Nutrition Introduction to Resource Management	50 50	25 25	75 75	33	09 09
Group III	(A) (B)	Introduction to Human Development Textile and Clothing	50 50	25 25	75 75	33	09 09
Group IV	(A) (B)	Community Development Personal Empowerment and Computer Basics	50 50	25 25	75 75	33	09 09
		Total	**700**				

DISTRIBUTION OF MARKS IN VARIOUS PRACTICALS

S.No.	Name of the Practical	Total M.	Sessional	Viva	Practical	Marks
1	BASIC NUTRITION	25	05	05	A. **Preparation &Presentation) any one Recipe** B. **Taste**	10 05
2	INTRODUCTION TO RESOURCE MENAGEMENT	25	05	05	-	15
3	INTRODUCTION TO HUMAN DEVELOPMENT	25	05	-	A. **Preparation of any one article of Baby kit** B. **Toy or wearing Food of Imm. Chart**	10 10
4	TEXTILE & CLOTHING	25	05		A. **Drafting** B. **Stitching** C. **Weave**	05 10 05
5	COMMUNITYDEVELOPMENT	25	10	05	**Preparation of Audio-Visual aids**	10
6	PERSONAL EMPOWERMENT & COMPUTER BASIC	25	05	05	**Computer Practical**	15

M.M.50

OBJECTIVE:
- This course will enable the student to   understand the functions of food and the role of various nutrients, their requirements and the effects of deficiency and excess (in brief).
- Learn about the structure, composition, nutritional contribution and selection of different foodstuffs,
- Be familiar with the different methods of cooking, their advantages and disadvantages, Develop an ability to improve the nutritional-quality of food.

THEORY

UNIT-I

Concept of Nutrition – Food, Nutrition, Under and Over Nutrition, Health

1. Functions of Food
2. Basic Terminology (Blanching, Marination, in cookery- Caramalization, Seasoning)
3. Methods of Cooking

UNIT-II   Nutrients: Macro nutrients
Classification, sources, functions
Recommended Dietary-Allowances
Deficiency and excess (in brief)
Water
Carbohydrates
Fats
Protein
Fiber

UNIT-III Nutrients: Micro nutrients
Calcium
Iron
Magnesium
Zinc
Fluorine
Iodine, Selenium, Copper, Manganese
Fat-soluble vitamins (A,D,E,K)
Water soluble Vitamins (Thiamine, Riboflavin, Niacin, Vitamin C, Folic Acid ,Pyridoxine, Pantothenic acid and vitamin B12)

UNIT-IV Food, Structure Composition Classification and Functions.
- Cereals, Millets and their products
- Pulses, Legumes and their products
- Fruits and Vegetables
- Milk and Milk Products
- Nuts and oil Seeds
- Meat, Fish, Poultry and Eggs
- Tea, Coffee, Cocoa, Chocolate and other beverages
- Condiments and spices.

UNIT-V   Improving Nutritional quality of Foods:

- Germination
- Fermentation
- Substitution
- Fortification and Enrichments

REFERENCES:

Robinson, C.H., Lawler, M.R. Chenoweth,W.L and Garwick'A.E. (1986) : Normal and therapeutic Nutrition, 17th Ed., Macmillan Publishing Co.

Swaminathan, M.S. (1985) : Essentials of Food and Nutrition VI : Fundamentals Aspects VII: Applied Aspects.

Hughes, O.Behnion, M. (1970) : Introductory Foods, 5th Edn., MacMillan Company.

Williams, S.R. (198-9) -.Nutrition and Diet Therapy, 4th Edn., C.V. Mosby Co.

PRACTICAL

OBJECTIVES:

1. To acqure skills in food preparation techniques.
2. To use appropriate methods of cooking for preparation of specific food products.

I

1. Weights and Measures standard and household measures for raw and cooked food.
2. Preparation of two recipes using cooking methods Boiling, Steaming, Baking, Roasting, Frying and Grill

II   **Vegetables**
- a. Simple salads and sprouting
- b. Curries

III   **Fruits**

Fruit preparations using fresh and dried fruits.

IV   **Milk**
- a. Porridges
- b. Curds, paneer and their commonly made preparation.
- c. Milk based simple desserts and puddings – custards, kheer, ice-cream

V   **Soups**

Basic, clear and cream soups

VI   **Peanut chikki, Paushitik ladoo**

REFERENCES:
1. Robinson, C.H., Lawler, M.R., Chenoweth, W.L. and Garwick A.E. (.1986) : Normal and Therapeutic 'Nutrition, 17th Ed., Macmillan Publshing Co.

INTRODUCTION TO RESOURCE MANAGEMENT

M.M.50

FOCUS :

This course deals with the management of resources in-the family with particular reference to mobilising all the resources for achieving the family goals. It also deals with the factors motivating management and management applied to specific resources. The course intends to create awareness, appreciation and understanding of environment. The major environmental issues and problems are to be critically analysed for inculcating environmental consciousness among the learners and to help them take individual/ household/community level decision for making the physical environment condcive for . family living. The course content has to be taught at an elementary level.

OBJECTIVES :
1. To create an awareness among the students about, management in the family as well as the other systems.
2. To recognize the importance' of wise use of resources in order to achieve goals.
3. The physical environment and its components and the major issues.
4. The impact of human, activities on environment
5. The action needed for checking environmental threats

THEORY

Unit – I

1- Introduction to Resource Management Definitions
2- Types of Management
3- Advantages of Management Limitation in Management

Unit – II   Factors Motivating Management

1- Goals – Definition, Types and Utility
2- values – Importance, Sources, Classification, Characteristics, Changing values.
3- Standards – Conventional and non conventional – qualitative, quantitative, conventional and non conventional.
4- Relation between values, goods and standard

Unit – III   (1) Resource

(a)   Types of Resources
(b)   Characteristics of Resource
(c)   Factors affecting use of Resources
(d)   Relation to Resources to Management

(2) Decision Making –

(a)   Definitions and Importance
(b)   Steps of Decision
(c)   Factors affecting decision
(d)   Resolving conflicts.

Unit – IV   Management Process -

1- Meaning, Definition and element of Management process – Planning, Controlling, Organising and evaluation.
2- Planning – Importance, Techniques and Types Organisation.
3- Controlling – Phases of Controlling, Factory in success of the control steps – suitability, promptness, New decisions, Flexibility
4- Supervision – Types of Supervision – Direction and Guidance
5- Evaluation – Importance, Types, Techniques of Self evaluation, Evaluation of whole process and management.

Unit – V   Management of Resources -
(1) Time Management – Tools – Time patterns, Time Cost, Peak Load, Work Curve, Rest Period, Time Norm.
(2) Energy Management –
    (a) Introduction, Types, Causes, Symptoms, of fatigue Measures to Relives. Process of energy management.
(3) Work Simplification Definition Importance, Techniques – Forma and informal pen and pencil techniques.

PRACTICAL (any six)

1 Identify and formulate various types of standard that student can have .
2 Identify and formulate five goals that a student will have.
3 Identify and formulate various types of decision, write process of decision making.
4 To work out minimum and maximum working approach. (Vertical and horizontal)
5 Take up a situation trip/function/picnic/party and manage that situation. Write the process of management implementing and report.
6 Making time plan for a student (at least for a week) and explain it.
7 To develop simplify methods of any work.
8 Visit to energy garden.

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Group – III
Paper- A
INTRODUCTION TO HUMAN DEVELOPMENT

M.M.50

FOCUS:

This is an attempt to guide undergraduate students in understanding of the field of Human Development in a basic way.

A Concious deviation is taken from the stage-wise approach to. the life span so as to make the course more meaningful and to allow for flexibility in understanding human development, as a continuous process. All topics are given a cross-cultural orientation. The major topics covered are : An overview of the field ; factors important for growth and development; different dimensions of development across the life-span namely, physical and motor, cognition, language, socio-emotional and personality and finally relevant issues in human development and social change.

Techers are encouraged to use the points of emphasis mentioned and culturally relevant examples to stimulate throught and participatroy discussion. The use of Video-films is also recommended to suppliement course content and facilitate discussions. This course purports to create awareness and appreciation for the role and functions of marriage and family as basic institutions. The changing trends, the dynamics of adjustment and contemporary problems and issues are to be critically analysed for developing better understanding of needs, adjustment areas and intervention strategies.

OBJECTIVES:

The student will –

1.   Acquire knowledge and insights about the dynamics of contemporary marriage and family systems in India.
2.   Become acquainted with the concept, goals and areas of adjustment, relationship within the family.
3.   Become aware of her changing roles and relationships with the family.
4.   Understand the dynamics of families in distress and crisis.
5.   To introduce student to the field of human development-concept, dimensions and interrelations
6.   To sensitize students to social and cross-culture contexts in human development.
7.   To sensitize students to interventions in the field of human development

THEORY

Unit –I   An overview on the field of HD

i   what is human development? Why do we need to studyit? defenition of development,ie. family and society, variations across cultures and individual differences inHuman development.

ii   family and child welfare ;**a**. family welfare programme, **b**. childwelfare programme,

iii   Growth and Development
            a.   Understanding growth and development (Definitions)
            b.   General Principles of development.
            c.   Constraints and facilitators in growth and development (influences of heredity and environment)

- • Genetic inheritance: (i) fertilization (ii) Number of chromosomes. (iii) the uniqe third pair determines sex, (iv) genotype and phenotype, (v) sex linked genetic effects.
- • Environmental per-requisites: (i) Nutrition, (ii) opportunities.
- • Interaction between environment and inheritance: (i) genes provide the predisposition, range and direction of development, (ii) environment determines the extent or limit.
- • The beginning of a new life
- - Prenatal development
- - Prenatal influences on the child: biological risks, age of mother, physical characteristics, illness, diet and nutrition, stress and emotional strains environmental hazards.

UNIT-II **Physical Development**
- - The new born physical appearance: size, weight, bodily proportions, sensory capacities i.e. hearing, vision, taste, smell,, touch, temperature and position.
- - Changes in size, shape, muscles and bones, and brain as it continues through : infancy end of infancy,
- - Linking physical and motor development.

Motor development: reflexes in infancy; major milestones through end of infancy,
- - Physical and motor development can be influenced through : (i) Maturation, (ii) nutrition, (iii) monitoring and healthcare, (iv) stimulation, (v) practice.

UNIT-III **Cognitive Development Across the Life Span**
- a. Cognitive development
- - The concept of intelligence
- - (A brief introduction to Piaget's theory)introduce stages withour much elaboration : sensorimotor stage in infancy concrete operational stage in childhood changes in remembering the reasoning in middle childhood, formal operations in adolescence, fluid and crystallized intelligence in adulthood, declining cognitive abilities in late adulthood and old age.).

The Developmet of Language Across the Life Span
Language as a form of communication
- - Functions of language : expressing wishes, controlling others, interacting with others, expressing individuality, exploring the world, pretending, using language to communicate/share information, understanding our society and culture, reasoning.
- - Communicating before language development i.e. the stages of vocalization : undifferentiated crying, differentiated crying, babbling, Imitation of sound, patterned speech.
- - Beginning to use language : one or two word utterances; early sentences; telegraphic speech; understanding metaphors, smiles, irony, reflecting on superficial and deeper level meanings of sentences.
- - Uses of language; conversational acts (non-verbal) conversational conventions, learning to listen.
- - Language development can be influenced through : (i) maturation, (ii) stimulation
- - Deviations in language development : in language development : Possible decline of language in the aged, (speech- impairment and disorders to be introduced briefly).

UNIT-IV　　Socio-emotional Development Across the Life Span
　　　　　　　a.　　Understanding social and emotional development
　　　　　　　b.　　Social development :
　　　　　　　　　　-　　Introduce socialization as an important part of the process of becoming human.
　　　　　　　　　　-　　Social milestones : beginning with the emergence of the social smile; attachment, separation, anxiety, acquiring sex roles in childhood, induction into occupational roles by adulthood, social isolation and consequences in late adulthood and in the elderly.
　　　　　　　　　　-　　Patterns and role of parent-child interactions, interactions with siblings and peers; social and cultural interactions through infancy to old age.
　　　　　　　c.　　Emotional development
　　　　　　　　　　-　　Emotions serve two adaptive functions : (i) motivating and (ii) communication.
　　　　　　　　　　-　　Basic emotional reactions (joy, fear, jealousy, anger, sadness, aggressions)
　　　　　　　　　　-　　Components of emotion : (i) emotions are elicited by the context, (ii) include bodily activity, (iii) emotional expressions are made through facial expressions, bodily movements, vocationalization, (iv) labelling emotions. Emotions may be acquired as a result of/by the Influence of - (i) internal and external sources, (ii) cognition, (iii) learning and (iv) social reinforcement.
　　　　　　　　　　-　　Milestones of emotional development through infancy and childhood emotional confusions and adolescence, stability of emotions in adulthood and old age.
　　　　　　　　　　-　　Emotional problems : (i) depression, (ii) over-activity, (iii) aggression.

Personality Development Across the Life Span
　　　　　　　a.　　Personality Development
　　　　　　　b.　　Personality may be influenced by : (a) heredity, (b) environment (parenting styles, peer groups, social interactions, early childhood experiences, life events, support available in a community etc.)
　　　　　　　c.　　The role of social norms in personality development. Deviant personalities : (juvenile delinquency in childhood and anti-social personalities in adulthood)

UNIT-V　　**Marriage**
　　　　　　　a.　　Marriage as an institution : goals, rituals, functions, changes and challenges.
　　　　　　　b.　　Mate selection : factors influencing, considerations of exogamy and endogamy, changing trends, arranged and personal choice of mates.
　　　　　　　c.　　Preparation for marriage, social emotional issues, financial concerns and exchanges, guidance and counseling.
　　　　　　　d.　　Marital adjustment, areas and factors influencing: planned parenthood.

Families with Problems
　　　　　　　a.　　Families with marital disharmony and disruption, dimension, casual factors.
　　　　　　　b.　　Families in distress, violence and abuse, dowry victimization, violence against women.

Interventions for Families in Trouble
　　　　　　　a.　　Counseling premarital and marital
　　　　　　　b.　　Public awareness and education programmes

PRACTICAL

Production to Human Development and Family Dynamics
1.   Visit to a pediatric ward to observe a new born body and a premature baby.
2.   Preparing a growth average height weight chart of five (5) children from one to (1 -3) years.
3.   Study of immunization schedule.
4.   Survey of parent's regulative awareness about weaning food, toys; clothes.
5.   Preparation of body Kit- Baby carry bag, bib, Jhabla.

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B.Sc. (HOME SCIENCE) PART- I

Group – III
Paper- B
TEXTILE AND CLOTHING

M. Marks: 50

FOCUS:
(**A**)Variety in clothing depends on variety of textiles. Though very few textiles were known to man earlier, presently, he is seeing newer textiles each one superseding to other. Their performance is also varying. It is essential for a student to have some basic knowledge of these textiles to select the right kind of fabric for specific use.
(**B**) Clothing is important for protection, comfort,personality and growth in relevant age groups .the course should dealt with ,keeping in view the activities of concerned age group with consideration for safety, ease of care and comfort.

OBJECTIVES:
To enable students to-
1. To acquaint with proper notion regarding choice of fabrics
2. To develop skills in clothing construction
3. To acquaint with different textiles and their performances
4. Impart knowledge on different textiles finishes

THEORY

Unit – I
1. Introduction of the Subject
2. Common Terminologies used in Textile
3. Properties of Textile Fibers
   Classification of the textile fibres : History, composition, types, production
   & properties
   - Natural Fiber – Cotton, Linen, Silk, Wool
   - Man-Made Fiber – Rayon
   - Thermoplastic Fiber – Nylon

Unit – II
1. Study of Yarn
   - Meaning, Yarn Making : Mechanical & Chemical
   - Types – Simple, Complex, Novelty and Textured yarn
   - number , yarn count ,Yarn Twist

2. Methods of fabric construction
   - Weaving : Handloom and its parts.
   - Different types of weaves- Plain weaves, Floting weaves, Pile, Jaquard and Leno weaves.
3. Other methods of fabric construction : Felting, Knitting, Crocheting, Braiding & Lacing

Unit – III
1. Finishes : Meaning and purpose
   - Physical finishes : Singeing , Napping ,Brushing ,Shearing, sizing , shrinking , tentaring, Calendaring etc.
   - Chemical finishes : Bleaching & mercerizing

- Special purpose finishes : wrinkle resistance , water resistant & water repellent , Flame retardant , crease resistance , soil resistant etc.

2.   Identification of Fabric
- Appearance test / Microscopic test
- Burning test / Creasing test
- Breaking test / Tearing test & Chemical test

3.   Importance of Clothing

Unit – IV
1. Dyes
     - Definition and Classification
     - Different types of dyes : Natural & Synthetic dyes
     - Suitability of various dyes to different fibres
2. Dyeing methods of different stages of processing :
     - Fiber , yarn , piece , union & cross
3. Household method of dyeing
4. Colour fastness
     - Characteristics of colour fastness
     - Fastness to sunlight ,crocking ,perspiration

 Unit – V
1. Printing
     - Its significance
     - Methods of printing : Block, Stencil, Screen & Roller printing
     - Advantages and disadvantages of various methods of printing
     - Faults in different printing methods
     - Preparation of printing paste
     - Preparation of cloth for printing
     - After treatment of printed goods
     - Resist dyed - Bandhej of Gujrat and Rajasthan

PRACTICAL
1. Identification of yarn
2. Identification of textile fibres :
   - Visual test / Microscopic test
   - Burning test /Chemical test

3. weaves and their variations :
   - Plain weave / Twill weave
   - Satin & Sateen weave
   - Honeycomb & Birdseye weave

4. Printing
   - Block printing / Screen printing / Stencil printing

 5. Tie & dye

6. Simple dyeing of different fabrics
7. Finishing of fabric before dyeing & printing
   - Scouring
   - Bleaching
   - Designing

8. Bleaching & whitening
9. Starching
10. Laundering of cotton, silk, wool and synthetic fabric
10. Batik

Group – IV
Paper-A
COMMUNITY DEVELOPMENT

M. Marks: 50

FOCUS

The focus of the course is on the evaluation of approaches to community development in general and in our country in particular. The course focuses on the structure of rural and urban communities, the systems comprising of interacting structures and interlocking of these to form the existing society. It will also indicate the relationship of social change to changes in the structures and systems that exist. It is expected to help students to orient themselves to be part of the development process.

OBJECTIVES: To enable students to

1. Be aware of the approaches to development
2. Develop faith in the capacity of the people, to take responsibility for their own development.
3. Understand the existing support structures for development efforts.
4. Understand the role of non Govt organizations in community development.
5. Understand the socio - economic structures and systems that make up the rural and urban communities.
6. Understand the meaning of social change through development plans and programs in the context of the exiting socio-economic structures and systems.
7. Recognise one's own role in the development process.

THEORY

UNIT-I   Development:

a. Definitions, types - large scale and centrally planned and small scale and locally planned.
b. Goals, the purpose of developmet - processes of development - the input process and social action process.

Historical Perspective of Development Approaches:

a. The Capitalistic approach.
b. The welfare approach
c. The Gandhian approach
d. The modernisation approach
e. The institutional and social justice approach

Critical Development Issues :

a. Massive poverty
b. Food security

Community Development in India :

a. Evolution of community development programme in India since Independence.

UNIT-II   Support structures and their Functions :

a. Central Social Welfare Board
b. State Social Welfare Board
c. National Level Voluntary Agencies such as CAPART, KVIC.
d. Elected Panchayats.

Community Development Programme Approaches :
a. Multi-purpose
b. Target group
c. Growth centred
d. Area
e. Minimum needs
f. Antyodaya
g. Integrated

Home Science and Community Development :
Scope of Home Science Extension for meaningful participation in community development in India

UNIT-III **(a)** **Analysis of Social Relations of Groups Social Stratification -Caste System (Micro/Macro)**

Differential ranking of groups as superior and inferio caste-groups; changes that have taken place/expected; abolition of untouchability, inter-caste collaboration, fusion of sub-castes; impact of reservations; social inequalities - extent of acceptance or opposition.

(4) Community development organization.

(5) Role of audio visual aids in community development.

UNIT-IV Poverty Analysis (Micro/Macro) causes of poverty and The number and proportion of poor (in general and with reference to gender in particular) prevalence of hunger and malnutrition, availability and accessibility to drinking water and sanitation facilities, health facilities, clothing and housing facilities, education facilities. Unemployment pattern and indebtedness; causes of poverty and inequalities; programs for poverty alleviation. Poverty line.

Social Relations in Religion and Culture (Micro/Macro)
a. Religions represented - the role of religion in the lives of people.
b. Popular expression of beliefs and attitudes that promote fatalism or confidence in themselves.
c. Religious and cultural customs and organisational opatterns that oppose the values of social justice, equality, liberty and solidarity.

UNIT-V **Analysis of Social Relation to Environment (Micro/Macro)~**
a. Customs, mores, rules, regulations that are eco-friendly and that are not eco-friendly.
b. Changing patterns of production and consumption-organic farming, soil and water conservation measures, recycling of wastes, use of bio-degradable articles etc., impact of these in the communities

Gender Analysis –
a. The concept of Gender as distinct from sex.
b. The division of labour.
c. Access and control of resource.
d. Changes in the means of gaining access to resources

Approaches and Methods of Socio-Economic Analysis-
a. Rapid Rural Appraisal
b. Participatory Rural Appraisal
c. Surveys, case studies, observation
d. Participant observations.

PRACTICAL

Field Experience in Village(s) / Urban Slums

a. Practical use of RRA / P R A Methods
b. Reporting on Socio-economic analysis of the rural / urban community
c. To select, Plan, preparation .& use of different-audio visual aids., aids, i.e.
    Chart - Educational, Tree Chart, Flow.
    Chart., Suspense Chart.-
    Posters -   Cartoons   Pemphlets   Puppets.
d. Conduct of survey based on Unit IV & V of Theory Papers, (any two)
e. Organising group demonstration.

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PERSONAL EMPOWERMENT AND COMPUTER BASICS

M. Marks: 50

FOCUS:

This course is designed to create awareness and understanding of the need for empowerment and motivating the student towards higher goals and challenges of self-improvement. The focus is on the adolescent moving towards making choices, developing competencies and skills for handling responsibilities of self-growth and^ interpersonal relationships in personal and professional spheres. The thrust of this course must be in the Indian context, creating pride in and respect for cultural heritage and values. The teaching approach should be truly a "facilitator"- convinced and committed to the cause of empowerment of youth.

The Purpose of inclusion of this course must be viewed as "offering opportunities, motivation, information and skills" for enhancing the total outlook (perspectives) of the young student particularly girls. Hence the thrust is on development, women and the concept of Home Science education as holistic education with interface (and intergration) of professionalism and qualitative development of individuals and families. The teacher (facilitator) for this course must share such an- outlook and be oriented towards the same to be really effective. Also the typical examination oriented approach should be replaced by promoting dynamism, visionary zeal and motivational ethos in the classroom.

This course is designed to give basic inputs to students on Computers and their functioning and hands-on experience.

The awareness of the basic applications of computers as the tool for education, information and research is to be created and emphasized. The teaching learning process should include demonstrations and hands-on experience for all the students. Individuals, families and community.

OBJECTIVES:

The student will

1. become aware of the need, competencies and skils to be developed **for** empowerment and be motivated for self improvement/self -enhancement.
2. become aware of the role of empowerment of women from the perspectives of personal and national development;
3. become aware of the interdiscipiinarity of Home Science education and its potential for personal and professional enhancement.
4. become sensitized to some pertinent contemporary issues that affect the quality of life of individuals, families and community.
5. know the basics of computers;
6. to be able to use computers for education, information and research.

NOTE :

Practical based and participatory teaching-learning methodology to be utilized : not conventional lectures. Dynamism on the part of the teacher is essential for successful outcome of the course.

THEORY

UNIT-I   Personal Growth and Personality Development
(Through exercises, role play, discussions)

   a.   The challenge : understanding and managing oneself : being aware of one's strenghts and weaknesses.
   b.   Personality Development: Factors and influences : emotional and motivational aspects; assertion vs. aggression.
   c.   Peer pressures : Issues and management; group conformity and individualism as co-existing aspects.
   d.   Conflicts and stresses, simple coping strategies.
   e.   Adjustment amd readjustment to changing needs and conditions of contemporary society (technological changes, social changes, changes in values)

UNIT-II   Empowerment of Women

   a.   Women and Development : The personal, familial, societal and national perspectives.
   b.   Capacity building for women : Education, decision-making abilities and opportunities, awareness and information on legal and political issues.
   c.   Women's organizations and collective strength : Women's action groups, women's participation in development initiatives.
   d.   Study and discussion of life histories, case studies of illustrious Indian women from different walks of life (eg. Indira Gandhi, Jhansi ki Rani, Medha Patkar, Kiran Bedi,' Vijayalaxmi Pandit, Sudha Chandran, Anutai Wagh, Ha Bhat, Bhanvari Devi)
         Brief sketches/ profiles of women's organization and collective and activist efforts to improve the quality of life or tackle issues of concern (e.g. SEWA, Women's co-operaatives, WIT).

Note :   Students must be sensitized and made aware through assignments to identify and study the contributions of women in their own regional areas as also in the context of national perspectives. Cases of individual and collective / organized women's strengths must be discussed with examples from local / regional / levels. Each student may prepare profiles of one individual and one collective group.

UNIT-III   Home Science Education as Empowerment

   1.   The interdiscipiinarity of Home Science Education.
   2.   The role of Home Science Education for personal growth and professional development.
   3.   Home Science as holistic education with integration of goals for persons, enhancement and community development.

UNIT-IV   Some Significant Contemporary Issues of Concern

   a.   Gender issues: inequities and discriminations, biases and stereotypes; myths and facts.
   b.   Substance abuse : Why and how to say no.
   c.   Healthy Habits : In relation to physique, to studies, to heterosexual interests.
   d.   AIDS : Awareness and education.

Note: Teachers/facilitators must be knowledgeable and equip themselves sufficiently; orientations/training sossions for tacilitatory .....

UNIT-V   Computer Fundamentals :

   a.   Overview about computers
   b.   Components of a computer
   c.   Input/output devices

d.   Secondary storage devices
e.   Number Systems : Decimal, Binary, Octal, Hexadecimal
f.   Representation of information : BCD, EBCDIC, ASCII
g.   Representation of Data : Files, Records, Files
h.   File organization and access
i.   Security and safely of data.
j.   Introduction to Operating Systems.

PRACTICAL

COMPUTER BASICS

1.   a.   Introduction
     b.   Exploring the Desktop
     c.   Running multiple programmes
     d.   Accessories
     e.   Control Panel
     f   Managing Documents and Folders

2.   MS Word
     a.   Starting MS-WORD
     b.   Creating and Formatting a document
     c.   Changing Fonts and Point Size
     d.   Table Creation and operations
     e.   Autocorrect, Auto Text, Spell Check, Thesaurus
     f.   Word Art, inserting objects
     g.   Mail merge, letter, label, envelope
     h.   Page set-up, Page preview
     i.   Printing a document

3.   MS-Excel
     a.   Starting Excel
     b.   Work Sheet, Cell, Inserting Data into Rows/Columns
     c.   Alignment,Text-wrapping
     d.   Sorting data, Auto sum
     e.   Use of functions, referencing formula cells in other formulae
     f.   Naming cells and ranges, Goal seek
     g.   Generating graphs
     h.   integrating Worksheet, data and charts with WORD
     i.   Creating Hyperlink to **a** WORD document
     j.   Page set-up, Print Preview, Printing Worksheets.

4   Internet
     a.   Genesis and use of Internet
     b.   Software and hardware tequirments for Internet
     c.   Accessing the Internet, Web Page, Unsing a Search Engine, Accessing the Internet from MS-Office applications

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B.Sc. (Home Science) PART- II
MARKING SCHEME

S.No.	Paper No.	Subject	Theory M. Mark	Practical M. Mark	Total	Theory M. Mark	Practical M.Mark
Group I	(A) (B)	**Foundation Course** Hindi Language-I English Language-II	75 75		75 75	26 26	
Group II	(A) (B)	Clinical Nutrition & Dietetics Textiles and Fiber Science	50 50	25 25	75 75	33	09 09
Group III	(A) (B)	Human Physiology & Community Nutrition Communication Process	50 50	25 25	75 75	33	09 09
Group IV	(A) (B)	Life Span Development Consumer Economics	50 50	25 25	75 75	33	09 09

DISTRIBUTION OF MARKS IN VARIOUS PRACTICALS

No.	Name of the Practical	Total Marks	Session	Viva	Practical	Marks
Group – II A	Clinical Nutrition & Dietetics	**25**	**05**	**05**	Planning Cooking + Presentation	**08** **07**
Group – II B	Textiles and Fiber Science	**25**	**05**	**05**	Stain Removal Tie & Dye Printing	**05** **05** **05**
Group – III A	Human Physiology &Community Nutrition	**25**	**05**	**05**	Spotting Blood Practicals	**10** **05**
Group – III B	Communication Process	**25**	**05**	**05**	Preparation of Audio Visual Aids - 2	**15**
Group – IV A	Life Span Development	**25**	**05**	**05**	Practical	**15**
Group – IV B	Consumer Economics	**25**	**05**	**05**	Practical	**15**

B.Sc. (HOME-SCIENCE) PART II
Group –II
Paper - A
CLINICAL NUTRITION & DIETETIES

M. Marks: 50

Focus : The course encompasses the various stages of the life cycle and how nutrition is critical at various stages. It briefly familiarizes students with the role of nutrition in common elements.

Objectives: This course will enable to students to -
1. Understand the concept of an adequate diet and the importance of meal planning.
2. Know the factors affecting the nutrient needs during the life cycle and the RDA-for various age groups.
3. Grain knowledge about dietary management in common ailments.

THEORY

UNIT-I **Definition of Health & Nutrition**
Dimensions of Health (Physical, Psychological emotional & Spiritual)

Energy Requirements - Factors affecting energy requirements-BMR, Activity, age, climate, diet - induced thermogensis (SDA physiological conditions.

Concept of nutritionally adequate diet and meal planning
(a) Importance of meal planning
(b) Factors affecting meal planning-Nutritional, Socio-cultural, Religious, Geographic, Economic Availability of time.

UNIT-II
Nutrition through the life cycle –
(At different activity and Social economic levels) requirements, nutritional problems, food selection.
(a) Adulthood
(b) Pregnancy
(c) Lactation
(d) Infancy
(e) Pre-School . -
(f) Adolescence
(g) Old age

UNIT-III **Principles of diet therapy**
(A) Modification of normal diet for therapeutic purposes, full diet, soft diet, Fluid diet, Bland diet.
(B) Energy modification and Nutrition for weight management- Identifying the overweight and obese etiological factors contributing to. Obesity Prevention & treatment, low energy diets.
(C) Under weight - etiology and assessment.
(D) High energy diet, Diet for febrile (fever) conditions & surgical condition.
Nutritional Anemia
(E) Fevers – Typhoid

UNIT-IV

Etiology, Symptoms & diet management of the following -Diarrhea, Constipation, Peptic ulcer, Jaundice, Viral Hepatitis, Cirrhosis, musculoskeletal disease ,Arthritis, Gout.

UNIT-V

Diet in disease of the endocrine –

Pancreas - Diabetes mellitus - classification, symptoms, diagnosis, Dietary care & Nutritional, management of diabetes mellitus. Insulin therapy, Oral Hypoglycemic agents, special dietetic food, sweeteners & sugar substitutes, Diabetic coma, Juvenile Diabetes.

Diseases of the Cardio Vascular system –

Atherosclerosis Etiology & Risk Factors.

Hypertension - Etiology, prevalence Nutritional management & prevention.

Renal diseases - Etiology, characteristic, Symptoms & Dietary management of Glomerulonephritis- Acute & Chronic

REFERENCES:
1. Krause, M.V. and Mohan, L.K. 1986 : Food, Nutrition and Diet Therapy, Alan R. Liss, Saunders Co., London.
2. Passmore, R. and Davidson, S. 1986 : Human Nutrition and Dietetics, Livingstone Publishers.
3. Robinson, OH., Laer, M.R. Chenoweth, W.L. Ganwick, A.E. 1986 : Normal and Therapeutic Nutrition, MacMillan publishing Company, New York.
4. Williams, S.R. 1989 : Nutrition and Diet Therapy, 4th Ed., C.V. Mosby Co.
5. Shils, M.E. Olson, J. A. Shike, M. Eds. 1994 : Modern Nutrition in Health and Disease, 8th edn., Lea and Febiger a Waverly Company.

Group-II, Practical-A

1. **Planning- Preparation of Normal and Therapeutic diet in relation to special and nutrient requirements (Any 15)**
   1 Adult
   2 Pregnancy
   3 Lactation
   4 Constipation
   5 Diarrhea
   6 Obesity
   7 Underweight
   8 Peptic Ulcer
   9 Jaundice
   10 Viral Hepatitis
   11 Cirrhosis
   12 Acute glomerulenephritis
   13 Chronic glomerule nephritis
   14 Diabetes mellitus **(using food exchange list)**
      (i) With Insulin
      (ii) Without insulin
   15 Hypertension(Atherosclerosis)
   16 Anemia
2. **Standardization of recipes**

M. Marks : 50
THEORY

Unit – I
1. Principles of laundry and its methods
2. Equipment for washing :
   - Washing equipment
   - Drying equipment
   - Finishing equipment
   - Storage equipment
3. Cleaning materials and Detergents :
   - Soap and detergent
   - Other cleaning agents
4. Water : Composition, Classification, Hardness of water, Methods of removal
        of hardness

Unit – II
1. Useful suggestions for laundering
2. Washing of different kinds of fabrics : Cotton ,wool ,silk & synthetic
3. Bleach agents and other reagents used in laundry
4. Starch : types and uses
5. Blue : types and uses

Unit – III
1. Dry Cleaning
2. Stain removal : classification and technique of stain removal
3. Disinfection of cloths
4. Care and Storage of fabrics
5. Consumer problems and protections

Unit – IV
1. Equipment and supplies used in clothing construction :
   - Measuring equipment
   - Cutting equipment
   - Stitching equipment
   - Finishing equipment

2. Sewing machine: its parts & function, maintenance of machine , problems faced and remedies.
3. Selection of fabric for dress according to Climate, Age, Occupation, Personality, Occasion, Figure Type, Fashion etc.
4. Wardrobe Planning

Unit – V
1. Tailoring
   - General Principles of clothing construction
   - Taking body measurement for different type of garments

- Interrelationship Of Needles, Thread, Stitch Length, & Fabric
- Cloth Estimation For Different Garments
- Drafting & Draping
2. Pattern Making
- General Instructions For Pattern Making
- Method
- Types & Layout
3. Fitting
- Fundamentals Of Fitting
- Problems Area In Fitting
- Factors Affecting Good Fit

Group-II, Practical-B

Printing - Block, screen, tie & die, stencil printing. -.
1. Stain Removal
2. Laundering of cotton, rayon silk wool & synthetics etc.
3. Bleaching & whitening
4. Starching
5. Care of household linen
6. Simple dyeing of different fabric.
7. Tie and Dye techniques
8. Batik
9. Finishing of fabric before dyeing & printing, Scoring, bleaching, Desizing.

REFERENCES:
Course: Introduction to Fashion Illustration
1. Tate, S.L**.,** Edwards, M.S. 1987 : The complete Book of Fashion Illustration, New York, Harper & Row Publications, 2nd Edn.
2. Allen, Anne & Seaman, Julian : Fashion drawing : basic principles, B.T. Batsford, London, 1993, 108p.
3. Barnes Colin : Fashion Illustration, Macdonald, 1988.
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6. Ireland John Patrick 1976 : Drawing and Designing Men's Wear, London B.T. Brandford Ltd.

HUMAN PHYSIOLOGY & COMMUNITY NUTRITION

M. Marks: 50

THEORY

Unit – I   An introduction of Physiology and Anatomy

1.   Cell – Structure and functions of human cell.
2.   Tissues – Classification and structure
3.   Cardiovascular System –
     (a)   Blood – Composition & Functions
     (b)   Heart – Structure and Functions
     (c)   Vessles – Structure and Functions of Artery, Veins and
        Capillaries.

Unit – II   Gastrointestional System :

1.   Structure and Functions of various organs of the gastrointestinal tract.
2.   Digestion and absorption of food.
     Nervous System :
     (a)   Elementary Anatomy of Nervous System
     (b)   Functions of different part of the brain and spinal card.
     (c)   Autonomic, sympathenic & parasympathetic nervous system.

Unit – III   Excretory System :

1.   Structure and functions of kidney, bladder, formation of urine.
2.   Structure and functions of spin.
3.   Regulation of temperature of the body.

     Respiratory System :

1.   Structure of Lungs.
2.   Mechanism of respiration and its regulation.
3.   Transportation of Gases

     Special Sense Organs :

1.   Structure and functions of eye, Ear, Nose, Skin & tongue.

Unit – IV   Musculo Skeletal System

1.   Types of Muscles and its functions.
2.   Skeletal System – Types of Bones.
     Reproductive System –
     Structure and functions of male & female reproductive organs.

Unit – V   Concept and Scope of Community Nutrition :

1.   Nutritional problems of the community & implications for public health.

     Common Problems in India – Causes (Nutritional and Non Nutritional Problems)

     Incidence of Nutritional problems, sigh, symptoms & Treatment.

     Protein-Energy Malnutrition (PEM)

2. Prophylaxis Programmes to Combat Nutritional Problems in India.

3. Food born disease-

-                     Food Poisoning
-                     Food Infections

REFERENCES:
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3. Wilson 1989 : Anatomy and Physiology in Health and Illness, Edinburgh, Churchill Livingstone.
4. Chatterjee Chandi Charan 1988 : Text book of Medical physiology, London, W.B.
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6. Anderson, D.B. and Mayer, B.S. 1970 : Plant physilogy, Van Nostrand Reinhold Company', East West Press Edition.
7. Kochhar, P.L. 1994 : A text book of plant physiology, Atma Ram & Sons, Delhi..
8. Dhami, P.S. 1987 : A text book of Zoology, S. Nagin & Company, Julundhar.
9. K.S. Gopalaswamy iyengar 1991 : Complete Gardening in India, Bangalore, Gapalaswamy Parthasarthy.
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Group-III, Practical-A

1. Recording pulse rate.

2. Measurement of Blood Pressure.

3. Preparation of temperature chart.

4. Study of Histological slides of different organs.

5. Visit to one Anaganwadi centre and record the activities conducted by Anaganwadi.

6. Testing of adulterants in common foods (any five).

7. Making report of midday meal programme running at nearby school.

M. Marks: 50

Focus:
The course focuses on the process of communication, especially in development work in rural and urban areas.

Objectives: To enable students to –
1. Understand the process .of communication in development work ;
2. Develop skirls in the use of methods and media ; and
3. Be sensitive to the interests and needs of the people and the power of the media and methods.in catering to these needs and interests.

THEORY

UNIT-I   Concept of development communication
  -    Meaning and importance of communication in development
  -    The purpose of communication
  -    Existing patterns of communication
  -    Factors that help or hinder communication

UNIT-II   Communication Precess
  -    One-way and two-way or interactive communication
  -    Gaps in communication or distortions in transmission of message and their causes
  -    Importance of two way communication
  -    Basis for effective, interactice communication.
  -    Attitude of 'respect for others

UNIT-III   Methods of communication in Development Methods to reach individuals
  -    Personal conference
  -    Interviews
  -    House visits
  -    Exhibits
  -    Methods to reach small groups
  -    Illustrated lecture
  -    Group discussions
  -    Co-operation

UNIT-IV   Role Plays
  -    Demonstrations
  -    Workshop
  -    Camps
  -    Radio announcements/programs
  -    Newspaper stories
  -    Posters
  -    Videos, films
  -    Television programmes
  -    Letters, folders or pamphlets
  -    Public meetings

UNIT-V   Media for development communication
-       Folk media Songs Stories Street-theatre
-       Games Arts
-       Puppet play Print media
-       Posters Pamphlets, leaflets
-       Newspapers - articles, stories
-       Periodicals - articles, stories, songs
-       Books
-       Cartoons
-       Audio/Visuals, Audio-Visual Media
-       Audio-tapes, radio broadcasts
-       Slides, pictures, drawings, photographs etc.
-       Videos, telecasts
-       Films-docummentary, feature

Group-III, Practical-B

(ANY SIX)

1.   Organising group discussion.

2.   Organising group demonstration.

3.   Preparation & Presentation of Audio visual aids, i.e. Posters, Charts, Cartoons, Models

       Puppets.

4.   Problem/need identification "of a community.

5.   Planning an educational programme.

6.   Evaluation of the effectiveness of methods and media.

7.   Visit to Radio Station/T.V. Centre/Printing Press.

8.   Preparation of Drama based on Social Development

M. Marks: 50

Focus :

This course covers the entire life span and traces the various developmental stages. Its encompasses in scope development in utero, infancy up to senesence identifying critical concerns in Socio-cultural perspectives.

To develop understanding of various methods and materials, which can be used-while working with children. The emphasis is on promoting creativity and use of different materials *to* allow for optimum development.

Objectives :

To become acquainted with developmental stages trom birth to old age.
1. To develop awareness of important aspects of development during the whole life span.
2. To know the reqDon Welers (1974): uirement of infants and fodders and develop skills to create play materials and designing learning experiences.
3. To understand the significance of various creative activities and teachers role in implementry them.

Note : For each of the following stages of development, the-influence and inter-actions of sociocultural and environmental factors needs to be discussed.

THEORY

UNIT-I
1. Life Span development and need to study development through the life cycle. Inter-relationship between the aspects of development.
2. Childhood period (2 to 12 years) - Definition, Characteristics and Developmental tasks. "Review (2-6 yrs to 6-12 yrs) of different developmental areas (Physical, motor, Social, emotional, intellectual.

UNIT-II
Adolescence (13 to 18 years)
1. Definition, Developmental tasks.
2. Physical Development - Puberty, growth, spurts, Primary and Secondary sex characteristics, early and late maturing adolescents.
3. Identity - Definition, body image, positive and negative outcomes (Role confusion, ego-identity)
4. Heightened emotionality- Meaning causes, expression characteristics of emotional maturity, conflict with, authority coping up strategies.
5. Problems - Drug and alcohol abuse, psychological breakdown (Behaviour) STD and AIDS.

UNIT-III
Adulthood (19 to 60 years) and ageing- (Early adulthood 19 to 40 years) Definition and characteristics Development tasks, significance of the period, reponsibilities and adjustment - New family, parenthood, independence, financial matters.
1. Middle Adulthood (41 to 60' years), Definition, physical changes (senses, diseases- Transitation Period.
2. Menopause- Health issues.

3.   Stresses in middle age, coping with stress to family.
4.   Preparation for retirement.
Late Adulthood and Ageing – Definition.
1.   Physiological changes, and health problems.
2.   Retirement-effect of retirement on self family, society financial problems faced.
3.   Recreational interest of the aged.
4.   Issues- Old age homes, loneliness, living in joint family, prolonged illness. (Plan visit to old age homes.)

UNIT-IV
Infancy and Toddlerhood (Emotional Aspect)
1.   Importance and ways of meeting child psychological needs to promote feeling of security, trust and acceptance.
     Activities according to developments for various age groups
(A) 0-6 months - Activities for simulating and sessions motor experiences with emphasis on seen, hearing, touching, feeling sensation and movements.
(B) 7 to 12 months - Integration of experiences involving more than one sense to deeper sensory motor experiences promotic manipulation, concept formation, communication and perceptual divtiminsyion.
(C) 13 to 24 months - Promotion of co-ordination and control of body movements, gross and fine motor skills. Strengthening concept formation, imagination and communication through language promotion of problem solving, environment to explore and satisfy curiosity and develop confidence.
(D)   25-36 months - Improvement in body movement and communication skills, social skills concept formation.

UNIT-V
Creativity
-    Concept of creativity and highlights of the role of creative expressions in overall development of children.
-    Creative expressions, Meaning and definition of creativity expressions.
-    Role of teacher in planning and fostering creative expressions.
-    Creative expressions.
-

Art Activities
-    Painting and graphics
     (a) Painting with brush, drawing with crayons, chalk, rangoli on floor, finger painting. (Some special characteristics of this medium)
     (b) Values, materials required, use of substituler from indeigenous materials.
     (c) Teacher's role in conducting activities.
     (d) Stages in child art.
-    Tearing, cutting, pasting and collage, mural
     (a) Values, materials requried and Teacher's role in conducting activities.
     (b) Development stages.
-    Printing
     (a) Types of printing i.e. block, vegetables, string, leaf, stencils, spray, crumpled paper, different textured surfaces.
     (b) Values, materials required techniques.
BLOCKS :
     (a) Some special features of this medium.
     (b) Types of blocks : hollow large blocks, unit blocks and small blocks.
     (c) Stages in block play.
     (d) Values, materials and accessories for block play.
     (e) Teacher's role

Other materials
- Sand
  - (a) Characteristics of the medium.
  - (b) Values, materials required and teacher's role.
- Water.
  - (a) Characteristics of the medium.
  - (b) Values, materials required and teacher's role.

Group-IV, Practical-A (ANY TEN)

1. Infancy and Toddlerhood
   1. A file to be prepared to list activities appropriate for age groups - 0-6 months, 7-12 months, 13 to 20 months and 25 to 36 months.
   2. Students be encouraged to observe materials available in the locality, Different types of shops, tailor.
   3. Develop play materials suitable for each age group.
   4. List activities, which can be used for working with different age groups.
   (a) 0 to 6 months.
   5. Prepare materials and design activities for seeing, hearing touching and feeling.
   6. Sensation and movement for soothing movements and exercises.
   (b) 7 to 12 months.
   7. Prepare materials and design activities for touching and feeling sensation and movement, and manipulation.
   (c) 13 to 14 months.
   8. Identify activities for gross motor development and prepare play materials available in the locality.
   9. Prepare play materials and list activities promote manipulation sensory experiences, concepts and language.
      Art Activity
   10. Visit to old age homes.
   Art Activities
   11**.** A few suggestions are given under each category as guideline students be encouraged to explore experiment with each media and understand the characteristics of each medium.
      Samples of each be included in the resource file which each student is expected to maintain along with description of values materials and technique used.
   12. Difficulty level of each activity be considered and decide its suitability for different age groups.
      - Painting and graphics
      - Prepare a variety of brushes from different types of brooms, cotton, wool, strips of cloth, feather etc

Tearing cutting and pasting
   13. 3-5 years
      Tearing with all fingers, tearing with thump and two fingers as used in holding pencil, tearing on straight line, curved line.
   14. 6-8 years
      Tearing circular rings starting from one corner of the page till centre of page, Making designs.
   15. 3-5 cutting and pasting
      Cutting a design, pasting, please of paper, cloth, sticks leaves college, mosaic Printing

Printing
   16. Printing with strings, leaf, vegetable blocks, stencil printing, thumb," finger, spray painting
   17. Keeping coins, leaves with veins below paper and gently colouring with crayon.

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2. Craig, G. 1999 : Human Development, N.J. : Prentice Hall

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4. Lerner, R.M. & Hultsch, D.F. 1983 : Human Development : A life Span Perpective. NY. MC Graw Hill

5. Rice, F.P. 1965 : Human Development : A life. Span Approach, NJ : Prentice Hall.

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B.Sc. (HOME-SCIENCE) PART- II
Group –IV
Paper - B
Consumer Economics

M. Marks: 50

THEORY

Unit – I   Consumer
      1-   Definition of consumer
      2-   Consumer rights and responsibility
      3-   Consumer buying habits convenience goods
      4-   Factors affecting consumer decision

Unit – II   Personal income
    (1)   Types of income – real, money, psychic, national income, disposable income.
    (2)   Saving and investment
    (3)   Sources of investment
    (4)   Factors affecting savings
    (5)   Ways of selecting investment

Unit – III   Consumer in the market
    (1)   Market- Definition, types of market, functions, channels of distribution.
    (2)   Buying motives – Primary selective, rational emotional and totranages.
        Types of Products
        Advertisement, Sales, Promotion packing
    (3)   Consumer Buying Problems
        (1)   Adulteration- kinds and identification of adulteration.
        (2)   Faculty weights and measure
        (3)   Pricing
        (4)   Legal – guarantee and warrantee contracts, installment buying
    (4) Buying process

Unit – IV   Consumer Protection services
    (1)   Organisations
    (2)   Legislation – import laws for consumer protection
    (3)   Consumer representation
        Consumer and consumers problems- choice and buying problems of consumer
    (4)   Consumer protective services
        (1)   Indian Standard Institution
        (2)   Educational Institution
        (3)   Consumer Co-operatives
        (4)   Government Agencies Municipality

Unit – V
    (1)   Consumer Decision making
    (2)   Factors effecting consumer decision in the market
    (3)   Good buy man ship
    (4)   Consumer aides for decision making

Group-IV, Practical- B

1- Test for adulteration
2- Filling of different types of form to protect consumer
3- Filling of form of investment services
4- Activity of educate consumer
5- Collection of samples of different symbols for helping consumer buying .
6- Project preparation in any relevant area.

References:

- Khanna S.R. Hanspal S. Kapoors and awasthi H.K. 2007 Consumer affairs, Universities Press India Pvt. Ltd.
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- Sherlekar, S.A. 1984 : Trade Practices and Consumerism, Himalaya Publishing House, (Unit I, VI)
- Sales Management, 5th Edu., Cunliffe Boiling, (Unit II, IV)
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- Beckman, T.R. Moyard.H.H. and Davidson, W.R. 1957 : Principles of Marketing, Ronald Press,. (Unit IV, VI)
- Gordon, L.J. and Lee. S.M. 1972 : Economics of Consumers, Dvan Vostrand, (Unit I, II. Ill
- Cochrane, W.W. and Bell, C.S. 1.958 : The Economics of Consumption, McGraw Hill.
- Conoyer, H.C. and Vailes, R.S. 1951 : Economics of Income and Consumption, Ronald Press.

B.Sc. (HOME-SCIENCE) PART III
MARKING SCHEME

Group No.	Paper No.	Subject	Theory M. Mark	Practical M. Mark	Theory M. Mark	Practical M. Mark
I	(A) (B)	**Foundation Course** Hindi Language English Language	75 75		26 26	
II	(A) (B)	Nutritional Biochemistry Food Preservation	50 50	25 25	33	09 09
III	(A) (B)	Early Childhood Education Extension Education	50 50	25 25	33	09 09
IV	(A) (B)	Foundation of Art and Design Apparel Making & Fashion Designing	50 50	25 25	33	09 09

DISTRIBUTION OF MARKS IN VARIOUS PRACTICAL

S.No.	Name of the Practical	Total Mark	Sessi.	Viva	Distribution	Marks
1	Nutritional Biochemistry	25	5	5	Titration, Identification of CHO, Blood	10 05
2	Food Preservation	25	5	5	Preparation Presentation	10 05
3	Early Childhood Education	25	5	5	Preparation Teaching	05 10
4	Extension Education	25	5	5	Practical – (2)	15
5	Foundation of Art & Design	25	5	5	Practical – (2)	15
6	Apparel Making	25	5	-	Stitching or Designing	10

M. Marks: 50

THEORY

UNIT-I

(A) Introduction to Biochemistry - definition, objectives, scope and interrelationship between Biochemistry and other biological sciences.

(B) Carbohydrates - Definition, classifications functions and properties of
- Monosaccharides   -   Glucose, Fructose, Galactose
- Disaccharides   -   Maltose, Lactose, Sucrose
- Polysaccharides   -   Dextrin, Starch, Glycogen
    Glycolysis, Gluconeogenesis, Glycogenesis
    Glycogenolysis, Citric acid Cycle.
    Blood sugar regulation.

UNIT-II

(A) Lipids   –   Definition, composition, importance and classification
    Fatty acids   -   Functions, properties ,classification of MUFA and PUFA.
        Significance of Acid value, Iodine value and saponification value.
        Chemistry and function of Phospholipids, Glycolipids and sterols.
    Metabolism   -   Beta Oxidation

(B) Aspects of transport – Passive diffusion, Facilitated diffusion, Active transport

UNIT-III

(A) Proteins   -   Definition composition function, and classification.
    Amino acids -   Essential and Nonessential
    Metabolism   -   Urea cycle, Nitrogen balance, Amino acid pool

(B) Enzymes   -   Definition, properties, classification, Mode of action of enzymes, factors affecting velocity of enzyme catalyzed reactions, coenzymes.

UNIT- IV

(A) Harmones   -   Biological roles of harmones of Pituitary, Adreral cortex and medull, Thyroid, Parathyroid, Pancreas, Sex glands.

(B) Urine   -   Formation and Composition

UNIT-V

(A) Blood – Blood composition & its Function, Blood Coagulation, Blood Groups

(B) Nucleic Acid and Nucleoproteins – Chemistry, composition, structure, functions

Practical

Nutritional biochemistry

1. Identification of Glucose, Fructose, Maltose, Lactose, Sucrose, Starch.
2. Colour and precipitation reactions of Protein.
3. Estimation of Glueose by Benedict's method.
4. Estimation'of Haemoglobin by acid hanmotion method.
5. Estimation of Glycine by Titration.
6. Estimation of ascorbic acid by idometric method.
7. Visit to pathological lab (**compulsory**) to study the
    - Method of collection of sample
    - Application of latest techniques
    - Processing of sample
    - Use of reference values of blood and urine

FOOD PRESERVATION

M. Marks: 50

THEORY

UNIT- I

Food and it's preservation.
Home and community level including commercial operations.
Principles of food Preservation
Causes of spoilage of food.

Unit - II

- Food Storage – Principles and Methods
- Fresh Foods – Fruits & Vegetables
- Dried Foods – Rice, Wheat & Pulses

Canning of Foods

- Definition and Principles of Canning
- Nutritive value of Canned Foods

UNIT-III

Pasteurisation
Effect on food quality.
Storage of pasteurised food.

Drying & **Dehydration**
Methods used and effect on food quality. Types of driers. Storage and deterioration of dehydrated food products.

UNIT-IV

Use of low temperature
Refrigeration and freezing methods, principles and applications. Preparation of foods for freezing influence on food components and structure. Self life of frozen foods

Pickling and Fermentation
Pickles, chutneys, ketchups sauces. Fermentation - Types, products and method use Establishment of a small scale industry / cottage industry.

UNIT-V

Chemical Preservatives
Preparation of Fruit, Juices, Squashes, Fruite Syrups, Cordials, Jam Jelly.

High Acid & High Sugar Products –
common defects, Preservation of crystalized and glazed fruits.

Nutritional Implications of food processing
Causes for loss of vitamins and minerals, Enrichment, Restoration and Fortification

REFERENCES :

1. Oser, B.L. 1965 : 14 Ed. Hawk's Physiologycal chemistry, Mc Graw Hill Book Co.

2. William, S. : 16th Ed. JAOAC, Official methods of Analysis, Part I to XI, Manak Bhawan, New Delhi.

3. West E.S., Todd W.R., Mason, H.S. and Van Braggen J.T. 1974 : 4th Ed. Textbook of Biochemistry, Amerind Publishing Co. -Pyt. Ltd.

4. White A. Handlar, P. Smith E.L. Stelten, D.W. 1959 : 2nd Ed. Principles of Biochemistry, CBS Publishers and distributors.

5. Lehminger, A.L. Nelson, D.L. and cox, M.M. 1993 : 2nd Ed. Principles of Biochemistry,. CBS Publishers and distributors.

6. Stryer, L. '1995 : Biochemistgry, Freeman WH and Co.

7. Devlin, T.M. 1986 : 2nd Ed. Textbook of Biochemistry with clinical Correlations John witey and sons.

8. Murray, R.K. Granner, D.K. Mayes, P.A. Nd Rodwell V.W. 1993 : 23rd Ed. Harper's Biochemistry, Large Medical Book.

Practical

1. Preparation of Jam, Jellies marmalades.
2. Preparation of Pickles & chutneys.
3. Dehydration of Vegetables & Fruits.
4. Preparation of Papad, Badi, Chips
5. Preparation of synthetic syrups & squashes.
6. Survey of market products and packaging

M. Marks: 50

FOCUS-

The course focuses on need to provide various early childhood care and educational facilities through different programmes, for early childhood eduction. Types and present status of ECCE programmes are covered in this course. The recent policies affectionary young children are also included.

The course introduces students to the concept of curriculum for all round development of children. The main emphasis is on various components of curriculum to be included in daily program through medium of play. Method of learning by doing which forms the basis for understanding and knowledge is extended to the first two years of primary school.

OBJECTIVES :-

1. To know importance of early childhood care and significance of intervention programmes for early child development.
2. To understand major theoretical approaches and implication for early child development.
3. To become acquainted with current policies and programs in ECCE.
4. To meaning of curriculum and various components to be included in the daily programmes to promote all round development of children.
5. To recognize role of play in children's development.
6. To understand goals, principles, factors and approaches used in programme planning.
7. To recognize the advantages of project method and learn to use integrated approach in the development of daily programme.

THEORY

UNIT-I

Significance and objectives of early childhood care and education.
1. Significance of early childhood years in individuals development.
2. Meaning and need for intervention programmes for better growth and development.
3. Objectives of ECCE.
4. Different types of programs currently offered. Objectives of the program routine and target group covered by each of the following. ECE programme - Balwadi, anganwadi, Nursery school, Kindergarten, Montessori, laboratory nursery school ECCE Program - ICDS and mobile cretch. Play group : day care.

UNIT-II

Current Status and Expansion of Scope of ECE to ECCE
- Expansion from ECE to ECCE.
- Current Status of ECCE programme.
- Admission tests and effects on children.
- Effects of pressures on young children due to formal education.
- Need for ECCE programmes to provide quality care where mothers are at work.
- Global perspective - views of educationists - Froebel, Mac Millan sister, Deweu and Montessori,
- ECE in India : Overview of pre.and post independence period.
- Contributions of Ravindranath Tagore, Mohandas Gandhi, Gijubhai Bodheka, Tarabai Modak, Anutai Wagh.

    Recent Developments : Policies, Institutions and contributions of NGOs
- National policy on children.

- National policy on education 1986.
- Role of Indian Association of Preschool Education, National Institute of Public Cooperation and Child Development, National Council for Educational Research and Training, SCERT and NGOs.

UNIT-III

- Meaning of curriculum, Foundation of curriculum development.
- Impact of play as means of development and learning.
- Developmental stages of play.
- Types of Play - Solitary play, parallel play, associative play and coopertives play.
- Functions of play - play as a means of assessing children's development.
- Teachers Role in creating environment and Promoting play.
- Classical theories of play - Surplus energy theory relaxation theory, Pre-exercise & recapitulation theory.

Programme Planning

- Approaches to learning : Incidental and planned learning.
- Principles of programme planning :
- from known to unknown, simple to complex, concrete to abstract.
- Balance between individual and group activity, indoor and outdoor play, quiet and active plays, guided and free activities.
- Factors influencing programme planning.
- Formal versus non-formal approach in education : advantages and disadvantages.

UNIT-IV   Languages

- Goals of language teaching.
- Readiness for reading and writing. Meaning of readiness.
- Factor to be considered for readiness : Age, Vision, Hearing, Physical, emotional, social, experiential background, attention span, finer motor coordination, eye hand coordination, reading from left to right and top to bottom.

Mathematics

- Importance of number and mathematics.
- Number as a language and history of its development.
- Abstract nature of number.
- Mathematical readiness.
- Analysis of prerequisite skill for'number classification, comparing, seriation, patterning, counting, shape and space, measurement fractions, vocabulary, numeral operations.
- Operations and relevant rules and properties; subtraction, multiplication and division.
- Two and three dimension shapes, properties, characteristics.

Environmental studies

- Scope of environmental studies.
- Importance and goals of environmental studies.

UNIT-V   Project method

- Introduction
- Meaning and advantages of using project method.
- Planning .

Alternative to Home Work

- Disadvantages of learning by role.
- Suitable alternatives such as observations, exploration, experimentation and reporting orally, picture or at. Something related to the concepts covered in class.

Evaluation
- Need for evaluation.
- Formative and summative evaluation.
- Methods of evaluation : Observations.
- Evaluation of daly work, tools for evaluation
- Reporting to parents.

Practical (any four)

1. Plan three activities for children : list objectives, analyst tasks to achieve goals, select and organize instructional and learning materials, teacher's role, preparation of evaluation sheets i.e. chick list, rating scale.
2. Prewriting activities.
3. (a) Mathematics
   (b) Readiness
   (c) Materials for classifying, comparing, seriations, patterning, counting shapes, fractions, list vovabulary related to mathematical concepts.
   (d) Material for addition, subtraction, multiplication and divisions.
   (e) Graphs.
   (f) Experiences for understanding time distance weight, capacity and money.

4. Prepare a lesson for early childhood education.
5. Plan a project based on lessons of first and second standard, plan activities which children can do at home.
6. Visit to nursery school (**compulsory**).

PRFERENCES:
1. Alder, S., Farrar, C. 1983 : A Curriculum for developing communications skills in the preschool child. Illinois : Thomas Publications.
2. Anderson, P. Lapp, D. : Language skills in elementary education. New York, Mac Millan.
3. Armstrong, D., Savage, T. '1987 : Effective teaching elementary education. New York, Mac Millan.
4. Gelman, R., Gallistel, C.1986 : The child's understanding of numbers. Cambridge : Harward University Press.
5. Harlan, J. 1984 : Science experiences for the early childhood years. Columbus : Charles Merrill.
6. Jarolimek, J. Foster, C. 1985 : Teaching and learning in the elementary school, New York: Mac Millan.
7. Kaul, V. 1984 :.PIay as an instrument of-child growth. In play and child development, New Delhi, NIPCCD.
8. Khanna, S. 1992 : Khel Khoj : Ahmedabad : National Institute of Design.
9. Liebeck, P. How children learn mathematics. London : Penguin.
10. Lioyd L, Rechardson, K. 1980 : A mathematics activity curriculum for early childhood and special education, New York : Mac Millan.
11. Maxim, G. 1985 : The very young. Belmount, California : Wadsworth Publishing Company.
12. Neumann, E. 1971 : The elements of play. In D. Sponseller, ed. Play as a learning medium Washngton, DC, NAEYC..
13. Robinson, H. 1983 : Exploring teaching London : Allyn amd Bacon.
14. Tarapore, F., Kettis, G., Benninger, C. 1993 ; Child's Right to play. Pune : SNDT College of Home Science.

M. Marks: 50

THEORY

UNIT-I

1. Concept of Education

    (a)   Meaning of Extension

    (b)   Origin of Extension

2. Extension Education Process

    (a)   Environment for learning

    (b)   Role of educator

    (c)   Role of the people participants

3. Home science extension and community development

UNIT-II

4. Concept of adult / non formal education

    (a)   Meaning

    (b)   Purpose

5. Five Year Plans

    (a)   History of planning in India.

    (b)   Five year plans and their focus.

6. Planning at different levels- National to Grass roots.

UNIT-III

7. Programmes to enhance food production

    (a)   national food production programmes.

8. Poverty alleviation efforts and food security

    (a)   Programmes for poverty alleviation for rural and urban areas.

    (b)   Current programmes for rural and urban poor

UNIT-IV

9   Programmes for women and childrenWomen as target groups - specific measures for women and children such as DWCRA, ICDS, IMY. Current programmes for women as initiated and implemented by the different ministeries and departments.

10   PMKVY (Pradhan Mantri Kaushal Vikas Yojana).

11   Role of NGOs

Need for participation of Non-Governmental organizations in developmental efforts. Encouragement given NGO's.

UNIT-V

Advertising Media

12.   Different media for advertising.

13.   Methods of Extension Education

14.   Non-media advertising

15.   Outdoor advertisement - Hoardings, Posters, Billboards, Bulletin Boards, Electronic sings, Letterbins, Aerial methods.

16.   Transportation media (Mobile Vehicles)

17.   Exhibition and Trade fair.

Practical

1.   Visits to Radio / T.V. stations.

2.   Script writing for Radio.

3.   Visit to Extension Education Unit.

4.   Write slogan about Adult-Education.

5.   Designing an Advertisement for any product with relevant slogan at least two.

6.   Study of programme for women as target group and children.

Foundation of Art and Design

M. Marks: 50

THEORY

Unit – I   Introduction to foundation of art

1.   Design, Definition and types : Structural and Decorative
2.   Elements of Design :-

1.	Line	2.	Size
3.	Form	4.	Structure
5.	Space	6.	Pattern
7.	Shape		

8. Light – Characteristics and Classifications
9. Study of Colour – Classifications, Dimensions, Colour Schemes and effect.

3.   Principles of design – definition and their characteristics and types :-

1.	Balance	2.	Harmony
3.	Scale	4.	Proporation
5.	Rhythm	6.	Emphasis

Unit – II   **1. Indian, regional, traditional and contemporary arts and their use in :-**

1.   Floor decoration
2.   Home decoration
3.   Accessories

2. Appreciation of art

1.   In terms of principles of art and design
2.   In terms of composition and aesthetic appeal
3.   Flower arrangement material and principles.

Unit – III   1. Family's Housing Needs

1.   Protective, economic, affectional, social, standard of living, housing goals, style, function occupation.
2.   Factors influencing selection and purchase of site to house building
     1- Legal aspects, location, physical feature, soil conditions, cost, services

3.   House planning-
     1-   Reading house plants
     2-   Planning principles
          Grouping of rooms, orientation, circulation, flexibility, privacy spacious, ness, services, aestheriucs, economy, light and ventilation.
     3-   Planning different rooms: living room, bedrooms, kitchen, store room, toilet, passage, staircase.
     4-   Landscape planning-Principles and application.

UNIT-IV

    1.   **Financial Considerations** :
        1.   Availability of funds for housing
        2.   Housing Development finance corporation
        3.   Cooperative Housing Society
        4.   Life Insurance corporation
        5.   Cooperative Banks
        6.   Loan from provident fund
        7.   Finance corporation of India

    2.   **Disability of owning versus renting.**
        1.   Housing problems, causes and remedial measures.

UNIT-V

    1**.**   **Furniture**
        1.   Styles of furniture - traditional contemporary and modern.
        2.   Selection of furniture for comfort, rest and relaxation for work, for storage
        3.   Arrangement of furniture for living. Sleeping, dining and multipurpose rooms.
        4.   Uphosltered furniture materials, techniques and designs.

    2.   **Furnishing fabrics**
        1.   Types of curtains, draperies, floor coverings rugs and carpets, cushion covers
    2.   **Selection and use**.
        1.   Accessories and their role in interiors.

Practical (Any Eight)

1.   Freehand drawing : Memory drawing and sketching.
2.   Scale drawing, solid geometry, orthographic.
3.   Preparation of colour wheel and colour schemes.
4.   Elements of design laws of field size, proportion, types of shadows.
5.   Residential space planning - scale, lines, abbreviations, metric projections, defining space by shades, shadows.
6.   Lettering.
7.   Use of colour for wall/floor decoration and making accessories.
8.   Application of design principles in flower arrangement, styles of flower ar rangement, innovation of new styles.
9.   Gift wrapping and preparing decorative articles of sibre, fabric, coir, bamboo, clay, metal etc.
10.   Drawing houseplans with standard specifcation.
11.   Furniture layout of living, dining. Kitchen and bedroom designs presentation with furniture layout, sectional elevation, views.
12.   Development of designs and construction of any five of the under mentioned items -'. cushions, certains, carpets, doormats, rugs, table mates.
13.   Wall paintings, picture frame design.
14.   Graphic designs.
15.   Visit to Art and Craft exhibition

Marks : 50

THEORY

Unit – I

1.   Anatomy Of Human Body
- Skeleton & Muscular System
- Joints Of Human Body
   1. Normal Body
   2. Abnormal Body

1. Figure Problems & Different Types Of Figure Defects
   - Erect, Stooping, Low Shoulder, Square Shoulder, Thin Waist, Stout Waist, Long Body, Short Body, Full Back, Flat Back, Cylindrical, Corpulent, Head Forward, Head Backward

2. Deformity
   1. Natural & Accidental
3. Principle of Figure Drawing
4. Sketching of Different Body Features

Unit – II

1. Drawing Of Human Form In Different Angles
   - Front
   - Back
   - Side
2. Figure Head Theories
   - 8 ½ (Average Figure)
   - 12 ½ (Fashion Figure)
3. Introduction to Elements of Design
   - Color / Line
   - Texture
   - Shapes / forms
4. Principles of Design
   - Proportion
   - Balance
   - Harmony
   - Rhythm
   - Emphasis
5. Different types of Textile design
   - Structural / Decorative
   - Realistic / Abstract
   - Stylized / Geometrical

- Scrawly / Traditional

Unit – III
1. study of colour

   - Definition,
   - characteristics and
   - colour schemes

2. Color Theories
   - Prang's Color Theory
   - Munshell's Color Theory

3. Fashion
   - Definition
   - Theories
   - Fashion Trends In India
   - Terms Related To Fashion Industry
   - Factors Affecting Fashion

4. Necklines
   - Study of Different types of Necklines
   - Variations of Necklines

5. Collars
   - Study of Different types of Collars
   - Collars above the Necklines (Band Collars)
   - Collars below the Necklines (Flat Collars)

Unit – IV
1. Tucks : Different types of Tucks (Pin, Diagonal, Blind, Cross, Spaced, Diamond, Shell, Corded)
2. Pleats : Different types of Pleats (Simple, Knife, Box, Accordian, Kick, Reverse, Inverted Box)
3. Seam & seam finishes
4. Frills & Gathers
5. Yoke : Different types of Yokes (Body, Waist, Hip, Shoulder)
6. Sleeves : Different types of Sleeves (Plain, Puff, Raglan, Kimono, Dolman
7. Silhouettes

Unit – V
1. Embroidery
   - Fundamentals / Techniques
   - Design / Color Combination
   - Use Of Different Threads / Different Types f Stitches
2. Traditional Embroidery Of India
   - Kashida Of Kashmir & Bihar
   - Kantha If Bengal
   - Phulkari Of Punjab
   - Chikenkari Of Lucknow
   - Kasuti Of Karnataka

- Kutch & Kathiyawar Of Gujrat
- Zari Embroidery
- Applique Work
3. Entrepreneurship
- Meaning, Definition, Nature & Types
- Qualities of a Successful Entrepreneur
- Factors Affecting the Development of Entrepreneurship

4. Channels of Distribution : Meaning, Definition, Types & Functions
5. Salesmanship : Duties & Main Qualities of Successful Salesmanship, Salesmanship & Advertisement.

REFERENCES -
1. Bane, A. 1974 ; Railoring, Magraw Hill.
2. Bane, A. 1979 : Flat pattern Design, Mcgraw Hill.
3. Brary Nathalie 1978 : Dress Pattern Designing London, Crossby Lockwood & Staples.
4. Gilelle, D.A. Berte, B. : Figure Types & Size Ranges, Fairchild Publication.
5. Goublourn M. 1971 : Introduction pattern cutting, Grading and Modelling, London, B.T. Batsford Lts.
6. Goldsworthy 1980 : Simple Dressmaking, Londown, Mills and Boon.altd.
7. Littman Connie 1977 : Pattern Making Design, Litton Educational Publishing Inc.
8. Muka A. 1979 : French Touch, Pittsburgh, Wolfson Publishing Co., Inc.

Practical

1. Average Figure (8 ½ Head Length)
2. Fashion Figure (12 ½ Head Length)
3. Sketching of different Body Features & Different Hair Styles
4. Preparation of Samples of different types of Necklines
5. Preparation of Samples of different types of Collars
6. Preparation of Samples of different types of Sleeves
7. Preparation of Samples of different types of Yokes
8. Preparation of Samples of different tucks and pleats
9. Construction of Ladies Garment With Different Patterns
   - Frock : A line / short body / long body
   - Petticoat / Blouse,
   - A-Line Kurti / Fitted Kurti / Flared Kurti
   - Simple Salwar / Salwar With Belt / Patiyala / Churidar

10. All samples of traditional embroidery fix in the file
11. Draw design with different colour schemes
12. Reducing and Enlarging a design
13. Draw an objects involving various Elements of design

प्रपत्र

विषय / संकाय / प्रश्न—पत्र का नाम— **B.Sc. Information Technology**

क्रमांक	कक्षा का नाम	वर्तमान पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम का औचित्य
1.	1st Year	FUNDAMENTAL OF I.T. COMPUTERS & PC SOFTWARE	FUNDAMENTAL OF IT, COMPUTER AND PC SOFTWARE	Updation Required
2.	1st Year	PROGRAMMING CONCEPT USING C LANGUAGE	PROGRAMMING IN 'C' LANGUAGE	Updation Required
3.	1st Year	PRACTICAL	PRACTICAL	Updation Required
4.	2nd Year	DIGITAL CIRCUITS & COMPUTER H/W	DIGITAL CIRCUITS & COMPUTER H/W	No Change
5.	2nd Year	PAPER-II (PAPER CODE - 0875)	PAPER-II (PAPER CODE - 0875)	No Change
6.	2nd Year	PRACTICAL	PRACTICAL	No Change
7.	3rd Year	AMPLIFIERS AND OSCILLATORS	AMPLIFIERS AND OSCILLATORS	No Change
8.	3rd Year	FUNDAMENTAL DATA STRUCTURE	FUNDAMENTAL DATA STRUCTURE	No Change
9.	3rd Year	PRACTICAL	PRACTICAL	No Change

केन्द्रीय अध्ययन मंडल के अध्यक्ष एवं सदस्यों का हस्ताक्षर

S.N.	Name	Designation/University/College	Signature with Date
1.	Dr. Sanjay Kumar	Head, S.o.S. in Computer Science & I.T., Pt. R.S. University, Raipur	_signature_ 11-06-2018
2.	Mr. Hari Shankar Prasad Tonde	Head, Dept. of Computer Science, Sarguja University, Ambikapur	_signature_ 11-06-18
3.	Dr. Anuj Kumar Dwivedi	Head, Dept. of Computer Science, Govt. V.B.S.D. Girls College, Jashpur Nagar, Jashpur	_signature_ 11/6/18
4.	Mr. L.K. Gavel	Head, Dept. of Computer Science, Govt. G.S.G. P.G. College Balod	_signature_ 11/06/18
5.	Dr. J. Durga Prasad Rao	Head, Dept. of Computer Science, Shri Sankracharya Mahavidyalaya, Bhilai	_signature_ 11/6/18

B.Sc. Part – I
INFORMATION TECHNOLOGY
PAPER - I
FUNDAMENTAL OF IT, COMPUTER AND PC SOFTWARE
(PAPER CODE - 0824)

Max Marks: 50

NOTE: The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT - I INFORMATION TECHNOLOGY

Concepts of IT and Information System, Application of IT (in Business, Education, Medicine, Science, Governance and Agriculture), Impact of IT on society and industry, Legal and Ethical aspect of IT, Security and Threats in IT, M-Commerce, Virtual reality, Latest trend in IT, Future of IT.

UNIT - II COMPUTER NETWORK

BASIC CONCEPTS OF COMPUTER NETWORK: Internet concepts, LAN, MAN, WAN, Topology, Protocol, Transmission mode, communication process, Required elements of Data Communication.

WIRELESSCOMMUNICATION: Mobile Internet, GPS, 3G, 4G, Wi-Fi, Bluetooth, infrared, radio frequency, microwave.

SOCIAL NETWORKING: Evolution of social network sites (YouTube, Facebook, LinkedIn, Twitter), Advantages and Disadvantages of social networking sites.

UNIT - III MS-WORD

Introduction, Word Processing (MS-WORD), Advantage of word processing, Introduction and Installation, Editing a file, using paragraph styles. Newspaper style columns, Using macros, Advance word processing, Headers and footers, Finding text, Setting up printer. Mail merge and other applications, Mathematical calculator, Table handling.

UNIT - IV MS-EXCEL

Introduction to spreadsheet (MS-EXCEL), Definition and advantage of electronic worksheet, Working on spread sheets, Range and related operations, Setting saving and retrieving worksheets, Inserting, Deleting, Coping and Moving of data cells, Inserting and deleting rows and column, Protecting cells, Printing a worksheet, Erasing a worksheet in Graphs creation, Types of graphs, Creating a chart sheet 3D, Columns charts, Moving and changing the size of chart, Printing the chart.

UNIT - V MS-POWER POINT AND MS-ACCESS

MS-POWER POINT: Presenting with Power point: Creating presentation, Working with slides, Different types of slides, Setting page layout, Selecting background and applying design, Adding graphics to slide, Adding sound and movie, Creating chart and graph, Playing a slide show, Slide transition, Advancing slides, Setting time, Rehearsing timing, Animating slide, Animating objects, Running the show from window.

MS-ACCESS: Creating tables in access, Defining data types, Manipulating records.

TEXT BOOKS:

1. Computer Fundamentals, P. K. Sinha, BPB Publications, Sixth Edition.
2. Introduction to Information Technology, V. Rajaraman, PHI, Second Edition.
3. Computer Networks, Forouzan, Tata McGraw-Hill, Second, Edition.
4. Microsoft Office 2007 fundamentals, L Story, D Walls.
5. MS Office, S. S. Shrivastava, Firewall Media

B. Sc. PART - I
INFORMATION TECHNOLOGY
PAPER II
PROGRAMMING IN 'C' LANGUAGE

Max Marks: 50

NOTE: The Question Paper setter is advised to prepare unit-wise question with the provision of internal choice.

UNIT-I

Fundamentals of C Programming: Overview of C: History of 'C', Structure of 'C' program. Keywords, Tokens, Data types, Constants, Literals and Variables, Operators and Expressions: Arithmetic operators, Relational operator, Logical operators, Expressions, Operator: operator precedence and associatively, Type casting, Console I/O formatting, Unformatted I/O functions: getch(), getchar, getche(), getc(), putc(), putchar().

UNIT-II

Control Constructs: If-else, conditional operators, switch and break, nested conditional branching statements, loops: do while, while, for, Nested loops, break and continue, goto and label, exit function.

Functions: Definition, function components: Function arguments, return value, function call statement, function prototype, Types of function, Scope and lifetime of variable, Call by value and call by reference. Function using arrays, function with command line argument. User defined function: maths and character functions, Recursive function.

UNIT-III

Array: Array declaration, One and Two dimensional numeric and character arrays, Multidimensional arrays.

String: String declaration, initialization, string manipulation with/without using library function.

Structure, Union and Enum - Structure: Basics, declaring structure and structure variable, typedef statement, array of structure, array within structure, Nested structure, passing structure to function, function returning structure. **Union:** basics, declaring union and union variable, **Enum:** declaring enum and enum variable.

UNIT- IV

Pointer: Definition of pointer, Pointer declaration, Using & and * operators. Void pointer, Pointer to pointer, Pointer in math expression, Pointer arithmetic, Pointer comparison, Dynamic memory allocation functions – malloc, calloc, realloc and free, Pointer vs. Array, Array of pointer, Pointer to array, Pointers to function, Function returning pointer, Passing function as Argument to function, Pointer to structure, Dynamic array of structure through pointer to structure.

UNIT-V

File Handling and Miscellaneous Features: File handling: file pointer, File accessing functions: fopen, fclose, fputc, fgetc, fprintf, fscanf, fread, fwrite, eof, fflush, rewind, fseek, ferror. File handling through command line argument. Introduction to C preprocessor #include, #define, Conditional compilation directives: #if, #else, #elif, #endif, #ifndef etc.

TEXT BOOKS:

1. Programming in ANSI C, E Balagurusamy, Tata McGraw-Hill, Third Edition.
2. Let Us C, YashwantKanetkar, Infinity Science Press, Eighth Edition.
3. Mastering C, K R Venugopal,Tata McGraw-Hill.
4. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, Prentice Hall, Second Edition.
5. Applications Programming in ANSI C, R. Johnsonbaugh, Martin Kalin, Macmillan, Second Edition.
6. The Spirit of C, Mullish Cooper, Jaico publishing House.
7. How to solve it by Computer, R.G.Dromey, Pearson Education.

Practical

- At least 20 Practical based on Syllabus of Paper-I and Paper-II.

INFORMATION TECHNOLOGY

PAPER - I

DIGITAL CIRCUITS & COMPUTER H/W

(Paper Code - 0874)

UNIT-I (A) Number Systems :

Octal and hexadecimal number, decimal rep., complements, addition, subtraction, multiplication, division, fixed point rep, floating point rep., other binary code-gray code, excess 3 gray, excess-3, 2421, etc. error detection code.

(B) Boolean Algebra :

Laws, demorgan's theorm, Simplification boolean expression & logic diagram, positive & negative logic, K-map and simplification of K-map.

UNIT-II Combinational circuits :

Half adder, full adder, flip-flop : SR, JK, D,T, sequential circuits : encoder, decoder, multiplexer, shift resister, binary counters, BCD adder.

UNIT-III Multivibrator circuits :

Monostable, astable, bistable, smitt trigger, clocked RS, master-slave flip-flop, edge triggered flip-flop, latch.

Intergrated circuits :

RTL, DITL, TTL, CMOS, MOS.

UNIT-IV (A) Central Processing Unit :

Introduction, register organisation, stack organisation, Instruction formats, Addressing modes.

(B) I/O organisatin :

I/O interfaces, Data transfer, types and modes, interrupts, DMA, IOP.

UNIT-V Memory organisation :

Memory hierarcy, main memory, Auxiliary memory, Associative memory, cache memory, virtual memory, memory management techniques.

REFERENCE TAXT BOOK :

1.	Integrated Electronics	-	Millman & Halkias
2.	Principle of Electronics	-	V.K. Mehta
3.	Digital Electronics	-	R.P. Jain
4.	Computer System Architecture	-	Morris Mano
5.	Digital Electronics & Computer Hardware	-	Morris Mano

PAPER - II

(Paper Code - 0875)

UNIT-I Ingroduction to OPP : Advantages of OPP, the Object oriented approach, characteristics of object oriented languages : object, classes, inheritance, reusability, polymorphism and C++.

B.Sc.-II

(54)

(Dr Sanjay Anwer)

Anuj 11/6/18
(Dr.A.K.Draivedi)

11/06/18
(L.K.Gavel)

11/6/18
(Dr. J.Durga Pd. Rao)

11.06.18
Hari shankar
Prasad Tandle

UNIT-II Function : function declaration, calling function, function definition, passing arguments to function, passing constant, passing value, fegerence argument, returning by reference, inline function, function overloading, default arguments in function.

UNIT-III Object and classes, using the classes, class constructor, class destructor, object as function argument, copy constructor, struct and classes, array as class member, static class data, static member functions, friend function, friend class, operator overloading, type of inheritance, bass class derive class, access percifier, protectedc, member function.

UNIT-IV Pointers : & and * operator pointer variables, pointer to pointer, void pointer, pointer and array, pointer and functions, pointer and string, memory management, new and delete, pointer to object, this pointer, virtual function : virtual function, virtual member function, accesses with pointer, pure virtual function.

UNIT-V File and stream : C++ steams, C++ manipulators, Stream class, string I/O, char I/O; object I/O, I/O with multiple objects, disk I/O.

REFERENCE TEXT BOOKS :

1.	Programming in C++	-	E. Balaguruswami
2.	Mastering in C++	-	Venu Gopal
3.	Object Oriented Programming in C++	-	Robert Lafore
4.	Let us C++	-	Y. Kanetkar

PRACTICAL WORK

1. The sufficient Practical work should be done for understanding the paper 2.

2. At least five programs on each unit from unit 2 to unit 5 be prepared.

3. All practical works should be prepared in form of print outs and be valuated while practical examination.

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INFORMATION TECHNOLOGIES

PAPER - I

(Paper Code-0928)

AMPLIFIERS AND OSCILLATORS

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 pushpull power amplifier, power and efficiency calculation for pushpull for pushpull power amplifier, Distortion in pushpull power amplifier, Advantages of pushpull power amplifier.

UNIT-II **FEEDBACK AMPLIFIERS AND OSCILLATORS** : Feedback in amplifiers, types of feedback positive, and negative feedback. Derivation of input and output impedance in voltage and current series feedback. Advantages of negative feedback. Positive feedback. Berkhauson criteria for sustained oscillator. RF oscillators-Hartley oscillatot, Colpetts oscillators (Qualitative study) relaxation oscillators, Multivibrators-Astable, Monostable.

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

UNIT-IV **THE INTEL 8080/8085 MICROPROCESSOR** : Introcution, 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 instructions the 8080/8085 stack, I/O and machine controlled instructions.

UNIT-V **PROGRAMMING THE MICROPROCESSOR** : Machine and assembling languages simplified instruction set, Instruction set, arithmetic poeration, Instructions set logical operations, instruction set data transfer operations, instruction set branch operations, instructuion set-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.

PAPER - II

(Paper Code-0929)

FUNDAMENTAL DATA STRUCTURE

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

Anuj 11/6/2018
(Dr. A.K. Diwivedi)

11/06/18
(L.K. Gavel)

11/6/18
(Dr. J. Dixy Prasad Rao)

11-06-18
(Dr. Sanjay Kumar)

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 list of queues, Header nodes, 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 sort, Quick sort, Bubble sort, Heap sort, Comparison of sorting methods.

UNIT-V 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 spanning Tree, The basic, Greedy Strategy for computing Algorithm of Kruskal and prims.

TEXT & REFERENCE BOOK :

Fundamentals of Data structure : By S. Sawhney & Horowith

Data Structure : By Trembley & Sorrenson.

Data Structure Using Pascal : By Tannenbaum & Alugenstein

Data Structure : By lipschuists (Schaume's Outline Series Mcgraw Hill Publication)

Fundamentals of Computer Algorithm : By Ellis Horowitz and 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 cuts and voluated while practical examination.

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B.Sc.-III

प्रपत्र

विषय / संकाय / प्रश्नपत्र का नामः **B.Sc. Part-I (Mathematics)**

Paper-I (Algebra and Trigonometry)

वर्तमान पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम का औचित्य
Unit-I Symmetric, Skew symmetric, Hermitian and skew hermitian, matrices. Elementary operations on matrices, Inverse of a matrix. Linear independence of row and column matrices, Row rank, Column rank and rank of a matrix. Equivalence of column and row ranks. Eigen values, Eigen vectors and the characteristic equations of a matrix. Cayley Hamilton theorem and its use in finding inverse of a matrix.	**Unit-I** ~~Symmetric, Skew symmetric, Hermitian and skew hermitian, matrices.~~ Elementary operations on matrices, Inverse of a matrix. Linear independence of row and column matrices, Row rank, Column rank and rank of a matrix. Equivalence of column and row ranks. Eigen values, Eigen vectors and the characteristic equations of a matrix. Cayley Hamilton theorem and its use in finding inverse of a matrix.	पाठ्यक्रम का वह भाग जो कक्षा—11 एवं 12 वी के पाठ्यक्रम में सम्मिलित हो चुका है, उसे हटाया गया है। इससे शेष भाग का विस्तार से अध्यापन कराया जा सकेगा।

प्रश्नपत्र का शेष भाग यथावत है।

Prof.H.K.Pathak   Prof.B.S.Thakur   Prof.M.A.Siddiqui   Dr.S.K.Bhatt   Dr.R.K.Mishra   Dr.A.K.Mishra   S.K.Gupta   Sangeeta Pandey

प्रपत्र

विषय / संकाय / प्रश्नपत्र का नामः **B.Sc. Part-I (Mathematics)**

Paper-II (Calculus)

वर्तमान पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम का औचित्य
Unit-III Integration of irrational algebraic functions and transcendental functions. Reduction formulae. Definite integrals. Quadrature. Rectification. Volumes and surfaces of solids of revolution.	**Unit-III** Integration of ~~irrational algebraic functions and~~ transcendental functions. Reduction formulae. Definite integrals. Quadrature. Rectification. Volumes and surfaces of solids of revolution.	पाठ्यक्रम का वह भाग जो कक्षा–11 एवं 12 वी के पाठ्यक्रम में सम्मिलित हो चुका है, उसे हटाया गया है। इससे शेष भाग का विस्तार से अध्यापन कराया जा सकेगा।
Unit-IV Degree an order of a differential equation. Equations of first order and first degree. Equations in which the variables are separable. Homogeneous equations. Linear equations and equations reducible to the linear form. Exact differential equations. First order higher degree equations solvable for x, y, p. Clairaut's form and singular solutions. Geometrical meaning of a differential equation. Orthogonal trajectories. Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations.	**Unit-IV** Degree an order of a differential equation. ~~Equations of first order and first degree. Equations in which the variables are separable. Homogeneous equations. Linear equations and~~ equations reducible to the linear form. Exact differential equations. First order higher degree equations solvable for x, y, p. Clairaut's form and singular solutions. Geometrical meaning of a differential equation. Orthogonal trajectories. Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations.	

प्रश्नपत्र का शेष भाग यथावत है।

Prof.H.K.Pathak   **Prof.B.S.Thakur**   **Prof.M.A.Siddiqui**   **Dr.S.K.Bhatt**   **Dr.R.K.Mishra**   **Dr.A.K.Mishra**   **S.K.Gupta**   **Sangeeta Pandey**

प्रपत्र

विषय / संकाय / प्रश्नपत्र का नामः **B.Sc. Part-I (Mathematics)**

Paper-III (VECTOR ANALYSIS AND GEOMETRY)

वर्तमान पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम का औचित्य
Unit-IV Plane the Straight line and the plane. Sphere. Cone. Cylinder.	**Unit-IV** ~~Plane the Straight line and the plane.~~ Sphere. Cone. Cylinder.	कक्षा–11 एवं 12 वी के पाठ्यक्रम में सम्मिलित हो चुका है, उसे हटाया गया है। इससे शेष भाग का विस्तार से अध्यापन कराया जा सकेगा।
प्रश्नपत्र का शेष भाग यथावत है।		

Prof.H.K.Pathak   **Prof.B.S.Thakur**   **Prof.M.A.Siddiqui**   **Dr.S.K.Bhatt**   **Dr.R.K.Mishra**   **Dr.A.K.Mishra**   **S.K.Gupta**   **Sangeeta Pandey**

<div align="center">

प्रपत्र

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विषय / संकाय / प्रश्नपत्र का नामः   **B.Sc. Part-II (Mathematics)**

<div align="center">

Paper-I (ADVANCED CALCULUS)
प्रश्नपत्र का पाठ्यक्रम यथावत है।

Paper-II   (DIFFERENTIAL EQUATIONS)
प्रश्नपत्र का पाठ्यक्रम यथावत है।

Paper-III   (MECHANICS)
प्रश्नपत्र का पाठ्यक्रम यथावत है।

</div>

Prof.H.K.Pathak   Prof.B.S.Thakur   Prof.M.A.Siddiqui   Dr.S.K.Bhatt   Dr.R.K.Mishra   Dr.A.K.Mishra   S.K.Gupta   Sangeeta Pandey

विषय / संकाय / प्रश्नपत्र का नामः   **B.Sc. Part-III (Mathematics)**

Paper-III (Optional Papers)

वर्तमान पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम	नवीन संशोधित पाठ्यक्रम का औचित्य
(I) PRINCIPLES OF COMPUTER SCIENCE (II) DISCRETE MATHEMATICS (III) APPLICATION OF MATHEMATICS IN FINANCE AND INSURANCE (IV) PROGRAMMING IN C AND NUMERICAL ANALYSIS (V) MATHEMATICAL MODELLING	(I) PRINCIPLES OF COMPUTER SCIENCE (II) DISCRETE MATHEMATICS ~~APPLICATION OF MATHEMATICS IN FINANCE AND INSURANCE~~ (III) PROGRAMMING IN C AND NUMERICAL ANALYSIS ~~MATHEMATICAL MODELLING~~	पूर्व में प्रचलित 5 वैकल्पिक प्रश्नपत्रों में से दो को अलोकप्रिय होने के कारण विलोपित किया गया है। विगत 10 वर्षों में किसी भी छात्र / छात्रा द्वारा उक्त प्रश्नपत्रों का चयन नहीं किया गया है।
प्रश्नपत्र का पाठ्यक्रम यथावत है।		

Prof.H.K.Pathak   **Prof.B.S.Thakur**   **Prof.M.A.Siddiqui**   **Dr.S.K.Bhatt**   **Dr.R.K.Mishra**   **Dr.A.K.Mishra**   **S.K.Gupta**   **Sangeeta Pandey**

MATHEMATICS
There shall be three compulsory papers. Each paper of 50 marks is divided into five units and each unit carry equal marks.

B.Sc. Part-I
MATHEMATICS
PAPER - I
ALGEBRA AND TRIGONOMETRY

UNIT-I   Elementary operations on matrices, Inverse of a matrix. Linear independence of row and column matrices, Row rank, column rank and rank of a matrix. Equivalence of column and row ranks. Eigenvalues, eigenvectors and the characteristic equations of a matrix. Cayley Hamilton theorem and its use in finding inverse of a matrix.

UNIT-II   Application of matrices to a system of linear (both homogeneous and nonhomogeneous) equations. Theorems on consistency of a system of linear equations. Relation between the roots and coefficients of general polynomial equations in one variable. Transformation of equations. Descarte's rule of signs. Solutions of cubic equations (Cardons method), Biquadratic equation.

UNIT-III   Mappings, Equivalence relations and partitions. Congruence modulo n. Definition of a group with examples and simple properties. Subgroups, generation of groups, cyclic groups, coset decomposition, Lagrange's theorem and its consequences. Fermat's and Euler's theorems. Normal subgroups. Quotient group, Permutation groups. Even and odd permutations. The alternating groups An. Cayley's theorem.

UNIT-IV   Homomorphism and Isomorphism of groups. The fundamental theorems of homomorphism. Introduction, properties and examples of rings, Subrings, Integral domain and fields Characteristic of a ring and Field.

TRIGONOMETRY :
UNIT-V   De-Moivre's theorem and its applications. Direct and inverse circular and hyperbolic functions. Logarithm of a complex quantity. Expansion of trigonometrical functions. Gregory's series. Summation of series.

TEXT BOOK :
1. I.N. Herstein, Topies in Algebra, Wiley Eastern Ltd., New Delhi, 1975
2. K.B. Datta, Matrix and Linear Algebra, Prentice Hall of India Pvt. Ltd.New Delhi, 2000.
3. Chandrika Prasad, Text-Book on Algebra and Theory of equations, Pothishala Private Ltd., Allahabad.
4. S.L. Loney, Plane Trigonometry Part II, Macmillan and Company, London.

REFERENCES :
1.   P.B. Bhattacharya, S.K. Jain and S.R. Nagpaul, First Course in linear Algebra, Wiley Eastern, New Delhi, 1983.
2.   P.B. Bhattacharya, S.K.Jain and S.R. Nagpaul, Basic Abstract Algebra (2 edition), Cambridge University Press, Indian Edition, 1997.
3.   S.K. Jain, A. Gunawardena and P.B. Bhattacharya, Basic linear Algebra with MATLAB, Key College Publishing (Springer-Verlag), 2001.
4.   H.S. Hall and S.R. Knight, Higher Algebra, H.M. Publications, 1994.
5.   R.S. Verma and K.S. Shukla, Text Book on Trigonometry, Pothishala Pvt. Ltd., Allahabad.

B.Sc. Part-I
MATHEMATICS
PAPER - II
CALCULUS

DIFFERENTIAL CALCULUS :

UNIT-I $\varepsilon - \delta$ definition of the limit of a function. Basic properties of limits. Continuous functions and classification of discontinuties. Differentiability. Successive differentiation. Leibnitz theorem. Maclaurin and Taylor series expansions.

UNIT-II   Asymptotes. Curvature. Tests for concavity and convexity. Points of inflexion. Multiple points. Tracing of curves in cartesian and polar coordinates.

INTEGRAL CALCULUS:

UNIT-III   Integration of transcendental functions. Reduction formulae. Definite integrals. Quadrature. Rectification. Volumes and surfaces of solids of revolution.

ORDINARY DIFFERENTIAL EQUATIONS :

UNIT-IV   Degree and order of a differential equation. Equations reducible to the linear form. Exact differential equations. First order higher degree equations solvable for x, y, p. Clairaut's form and singular solutions. Geometrical meaning of a differential equation. Orthogonal trajectories. Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations.

UNIT-V   Linear differential equations of second order. Transformation of the equation by changing the dependent variable/the independent variable. Method of variation of parameters. Ordinary simultaneous differential equations.

TEXT BOOK :

1. Gorakh Prasad, Differential Calculaus, Pothishala Private Ltd. Allahabad.
2. Gorakh Prasad, Integral Calculus, Pothishala Private Ltd. Allahabad.
3. D.A. Murray Introductory Course in Differential Equations, Orient Longman (India), 1976.

REFERENCES :

1. Gabriel Klambauer, Mathematical Analysis, Marcel Dekkar, Inc. New York, 1975.
2. Murray R. Spiegel, Theory and Problems of Advanced Calculus, Schaum's outline series, Schaum Publishing Co. New York.
3. N. Piskunov, Differential and Integral Calculus, Peace Publishers, Moscow.
4. P.K. Jain and S.K. Kaushik, An Introduction to Real Analysis, S. Chand & Co. New Delhi, 2000.
5. G.F. Simmons, Differential Equations, Tata Mc Graw Hill, 1972.
6. E.A. Codington, An Introduction to Ordinary Differential Equations, Prentics Hall of India, 1961.
7. H.T.H. Piaggio, Elementary Treatise on Differential Equations and their Applications, C.B.S. Publishe & Distributors, Dehli, 1985.
8. W.E. Boyce and P.O. Diprima, Elementary Differential Equations and Boundary Value Problems, John Wiley, 1986.
12. Erwin Kreysizig, Advanced Engineering Mathematics, John Wiley and Sons, 1999.

B.Sc. Part-I
MATHEMATICS
PAPER - III
VECTOR ANALYSIS AND GEOMETRY

VECTOR ANALYSIS :

UNIT-I   Scalar and vector product of three vectors. Product of four vectors. Reciprocal Vectors. Vector differentiation. Gradient, divergence and curl.

UNIT-II   Vector integration. Theorems of Gauss, Green, Stokes and problems based on these.

UNIT-III   General equation of second degree. Tracing of conics. System of conics. Confocal conics. Polar equation of a conic.

UNIT-IV   Sphere. Cone. Cylinder.

UNIT-V   Central Conicoids. Paraboloids. Plane sections of conicoids. Generating lines. Confocal Conicoids. Reduction of second degree equations.

TEXT BOOKS :

1.   N. Saran and S.N. Nigam, Introduction to vector Analysis, Pothishala Pvt. Ltd. Allahabad.

2.   Gorakh Prasad and H.C. Gupta, Text Book on Coordinate Geometry, Pothishala Pvt. Ltd., Allahabad.

3.   R.J.T. Bell, Elementary Treatise on Coordinate Geometry of three dimensions, Machmillan India Ltd. 1994.

REFERENCES :

1.   Murray R. Spiegel, Theory and Problems of Advanced Calculus, Schaum Publishing Company, New York.

2.   Murray R. Spiegel, Vector Analysis, Schaum Publishing Company, New York.

3.   Erwin Kreysizig, Advanced Engineering Mathematics, John Wiley & Sons, 1999.

4.   Shanti Narayan, A Text Book of Vector Calculus, S. Chand & Co., New Delhi.

5.   S.L. Loney, The Elements of Coordinate Geometry, Macmillan and Company, london.

6.   P.K. Jain and Khalil Ahmad, A Text Book of Analytical Geometry of two Dimensions, Wiley Eastern Ltd., 1994.

7.   P.K. Jain and Khalil Ahmad, A Text Book of Analytical Geometry of three Dimensions, Wiley Eastern Ltd., 1999.

8.   N. Saran and R.S. Gupta, Analytical Geometry of three Dimensions, Pothishala Pvt. Ltd. Allahabad.

MATHEMATICS

There shall be three compulsory papers. Each paper of 50 marks is divided into five units and each unit carry equal marks.

B.Sc. Part-II
Paper-I
ADVANCED CALCULUS

UNIT-I   Definition of a sequence. Theorems on limits of sequences. Bounded and monotonic sequences. Cauchy's convergence criterion. Series of non-negative terms. Comparison tests, Cauchy's integral test, Ratio tests, Raabe's, Logarithmic, De Morgan and Bertrand's tests. Alternating series, Leibnitz's theorem. Absolute and conditional convergence.

UNIT-II   Continuity, Sequential continuity, Properties of continuous functions, Uniform continuity, Chain rule of differentiability, Mean value theorems and their geometrical interpretations. Darboux's intermediate value theorem for derivatives, Taylor's theorem with various forms of remainders.

UNIT-III Limit and continuity of functions of two variables. Partial differentiation. Change of variables. Euler's theorem on homogeneous functions. Taylor's theorem for functions of two variables. Jacobians.

UNIT-IV   Envelopes, evolutes. Maxima, minima and saddle points of functions of two variables. Lagrange's multiplier method.

UNIT-V   Beta and Gamma functions, Double and triple integrals, Dirichlet's integrals, Change of order of integration in double integrals.

REFERENCES :
1. Gabriel Klaumber, Mathematical Analysis, Marcel Dekkar, Inc. New York, 1975.
2. T.M. Apostol, Mathematical Analysis, Narosa Publishing House, New Delhi, 1985.
3. R.R. Goldberg, Real Analysis, Oxford & I.B.H. Publishing Co., New Delhi, 1970.
4. D. Soma Sundaram and B. Choudhary, A First Course in Mathematical Analysis, Narosa Publishing House, New Delhi, 1997.
5. P.K. Jain and S.K. Kaushik, An introduction to Real Analysis, S. Chand & Co., New Delhi, 2000.
6. Gorakh Prasad, Differential Calculus, Pothishala Pvt. Ltd., Allahabad.
7. Murray R. Spiegel, Theory and Problems of Advanced Calculus, Schaum Publishing Co., New York.
8. Gorakh Prasad, Integral Calculus, Pothishala Pvt. Ltd., Allahabad.
9. S.C. Malik, Mathematical Analysis, Wiley Eastern Ltd., New Delhi.
10. O.E. Stanaitis, An Introduction to Sequences, Series and Improper Integrals, Holden-Dey, Inc., San Francisco, California.
11. Earl D. Rainville, Infinite Series, The Macmillan Company, New York.
12. Chandrika Prasad, Text Book on Algebra and Theory of Equations, Pothishala Pvt. Ltd., Allahabad.
13. N. Piskunov, Differential and Integral Calculus, Peace Publishers, Moscow.
14. Shanti Narayan, A Course of Mathematical Analysis, S.Chand and Company, New Delhi.

B.Sc. Part-II
Paper-II
DIFFERENTIAL EQUATIONS

UNIT-I   Series solutions of differential equations- Power series method, Bessel and Legendre functions and their properties-convergence, recurrence and generating relations, Orthogonality of functions, Sturm-Liouville problem, Orthogonality of eigen-functions, Reality of eigen values, Orthogonality of Bessel functions and Legendre polynomials.

UNIT-II   Laplace Transformation- Linearity of the Laplace transformation, Existence theorem for Laplace transforms, Laplace transforms of derivatives and integrals, Shifting theorems. Differentiation and integration of transforms. Convolution theorem. Solution of integral equations and systems of differential equations using the Laplace transformation.

UNIT-III   Partial differential equations of the first order. Lagrange's solution, Some special types of equations which can be solved easily by methods other than the general method, Charpit's general method of solution.

UNIT-IV   Partial differential equations of second and higher orders, Classification of linear partial differential equations of second order, Homogeneous and non-homogeneous equations with constant coefficients, Partial differential equations reducible to equations with constant coefficients, Monge's methods.

UNIT-V   Calculus of Variations- Variational problems with fixed boundaries- Euler's equation for functionals containing first order derivative and one independent variable, Extemals, Functionals dependent on higher order derivatives, Functionals dependent on more than one independent variable, Variational problems in parametric form, invariance of Euler's equation under coordinates transformation.

    Variational Problems with Moving Boundaries- Functionals dependent on one and two functions, One sided variations.

    Sufficient conditions for an Extremum- Jacobi and Legendre conditions, Second Variation. Variational principle of least action.

REFERENCES :
1. Erwin Kreysizig, Advanced Engineering Mathematics, John Wiley & Sons, Inc., New York, 1999.
2. D.A. Murray, Introductory Course on Differential Equations, Orient Longman, (India), 1967.
3. A.R. Forsyth, A Treatise on Differential Equations, Macmillan and Co. Ltd., London.
4. Lan N. Sneddon, Elements of Partial Differential Equations, McGraw-Hill Book Company, 1988.
5. Francis B. Hilderbrand, Advanced Calculus for Applications, Prentice Hall of India Pvt. Ltd., New Delhi, 1977.
6. Jane Cronin, Differential equations, Marcel Dekkar, 1994.
7. Frank Ayres, Theory and Problems of Differential Equations, McGraw-Hill Book Company, 1972.
8. Richard Bronson, Theory and Problems of Differential Equations, McGraw-Hill, Inc., 1973.
9. A.S. Gupta, Calculus of variations with-Applications, Prentice-Hall of India, 1997.
10. R. Courant and D. Hilbert, Methods of Mathematical Physics, Vots. I & II, Wiley-Interscience, 1953.
11. I.M. Gelfand and S.V. Fomin, Calculus of Variations, Prentice-Hill, Englewood Cliffs (New Jersey), 1963.
12. A.M. Arthurs, Complementary Variational Principles, Clarendon Press, Oxford, 1970.
13. V. Kornkov, Variational Principles of Continuum Mechanics with Engineering Applications, Vol. I, Reidel Publ. : Dordrecht, Holland, 1985.
14. T. Oden and J.N. Reddy, Variational Methods in Theoretical Mechanics, Springer-Verlag, 1976.

B.Sc. Part-II
Paper-III
MECHANICS

STATICS

UNIT-I   Analytical conditions of Equilibrium, Stable and unstable equilibrium. Virtual work, Catenary.

UNIT-II   Forces in three dimensions, Poinsot's central axis, Null lines and planes.

DYNAMICS

UNIT-III   Simple harmonic motion. Elastic strings. Velocities and accelerations along radial and transverse directions, Projectile, Central orbits.

UNIT-IV   Kepler's laws of motion, velocities and acceleration in tangential and normal directions, motion on smooth and rough plane curves.

UNIT-V   Motion in a resisting medium, motion of particles of varying mass, motion of a particle in three dimensions, acceleration in terms of different co-ordinate systems.

REFERENCES :
1.   S.L. Loney, Statics, Macmillan and Company, London.
2.   R.S. Verma, A Text Book on Statics, Pothishala Pvt. Ltd., Allahabad.
3.   S.L. Loney, An Elementary Treatise on the Dynamics of a particle and of rigid bodies, Cambridge University Press, 1956.

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.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. Intergrability 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. Neighbourhoods, 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. Choudhary, 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. Copson, 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.Sc. Part-III
PART - II
ABSTRACT ALGEBRA

UNIT-I Group-Automorphisms, inner automorphism. Automorphism of groups and their computations, Conjugacy relation, Normaliser, 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 Eisenstien criterion, polynomial rings over commutative rings, Unique factorization domain. R unique factorisation domain implies so is $R[x_1, x_2 ..... x_n]$. Modules, Submodules, 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. Adjoint 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.Sc. Part-III
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 **Artifical 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 Brookshear, Computer Science : An Overview, Addition -Wesley.
2. Stanley B. Lippman, Josee Lojoie, C++ Primer (3rd Edition), Addison-Wesley.

B.Sc. Part-III
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.Sc. Part-III
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 Eigenvalue 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 Mullish 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 IBHPublishing 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. Rubistein, Simulation and the Monte Carlo Methods, John Wiley, 1981.
14. D.J. Yakowitz, Computational Probability and Simulation, Addison-Wesley, 1977.

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.

Zoology
B.Sc. Part I 2018-19
Paper I
(Cell Biology and Non-chordata)

Unit:I
1. The cell (Prokaryotic and Eukaryotic)
2. Organization of Cell: Extra-nuclear and nuclear
   Plasma membrane, Mitochondria, Endoplasmic reticulum, Golgi body, Ribosome and Lysosome).
3. Nucleus, Chromosomes, DNA and RNA

Unit:II
1. Cell division (Mitosis and Meiosis).
2. An elementary idea of Cancer cells And Cell transformation.
3. An elementary idea of Immunity: Innate & Acquired Immunity, Lymphoid organs, Cells of Immune System, Antigen, antibody and their interactions

Unit:III
• General characters and classification of Phylum Protozoa, Porifera, and Coelenterata up to order.
2. Protozoa: Type study - Paramecium,
2. Porifera: Type study - Sycon.
3. Coelenterata: Type study - Obelia
.

Unit: IV
• General characters and classification of Phylum Platyhelminthes, Nemathelminthes, Annelida and Arthropoda up to order.
2. Platyhelminthes and Nemathelminthes: Type Study – Fasciola, Ascaris
3. Annelida: Type Study - Pheretima.
4. Arthropoda: Type Study - Palaemone.

Unit:V
• General characters and classification of Phylum Mollusca and Echinodermata up to order.
2. Mollusca: Type Study - Pila.
3. Echinodermata- Type Study- Asterias (Starfish).
.

Zoology
B.Sc. Part I 2018-19
Paper II
(Chordata and Embryology)

Unit:I
1. Classification of Hemichordata
2. Hemichordata- Type study-Balanoglossus
3. Classification of Chordates upto orders..
4. Protochordata-Type study - Amphioxus.
5. A comparative account of Petromyzon and Myxine.

Unit-II
1. Fishes-Skin & Scales, migration in fishes, Parental care in fish.
2. Amphibia-Parental care and Neoteny.
3. Reptilia- Poisonous & Non-poisonous Snakes, Poison apparatus, snake venom and Extinct Reptiles

Unit-:III
1. Birds- Flight Adaptation, Migration, and Perching mechanism, Discuss-Birds are glorified reptiles.
2. Mammals-Comparative account of Prototheria, Metatheria, Eutheria and Affinities.
3. Aquatic Mammals and their adaptations.

Unit:IV
1. **Fertilization**
2. Gametogenesis, Structure of gamete and Typesof eggs
3. Cleavage
4. Development of Frog up to formation of three germ layers.
5. Parthenogenesis

Unit:V
1. Embryonic induction, Differentiation and Regeneration.
2. Development of Chick (a) up to formation of three germ layers, (2) Extra-embryonic membranes.
3. Placenta in mammals.

Zoology
B.Sc. Part I 2018-19
Practical

The practical work will, in general be based on the syllabus prescribed in theory and the candidates will be required to show knowledge of the following:-
- Dissection of Earthworm, Cockroach, Palaemon and Pila
- Minor dissection—appendages of Prawn & hastate plate, mouth parts of insects, radulla of Pila.

(Alternative methods: By Clay/Thermacol/drawing/Model etc.)
- Adaptive characters of Aquatic, terrestrial, aerial and desert animals.
- Museum specimen invertebrate
- Slides- Invertebrates, frog embryology, Chick embryology and cytology,

Scheme of Practical Exam	**Time: 3hrs**
1. Major Dissection	10 Marks
2. Minor Dissection	05 Marks
3. Comments on Excersice based on Adaptation	04 Marks
4. Cytological Preparation	05 Marks
5. Spots-8 (Slides-4, Specimens-4)	16 Marks
6. Sessional	10 Marks

Zoology
B.Sc. Part – II 2018-19
Paper – I
(Anatomy and Physiology)

Comparative Anatomy of various organ systems of vertebrates:

Unit: I
- Integument and its derivatives: structure of scales, hair and feathers
- Alimentary canal and digestive glands in vertebrates
- Respiratory organs : Gills and lung , air-sac in birds

Unit: II
- Endoskeleton: (a) Axial Skeleton- Skull and Vertebrae, (b) Appendicular Skeleton Limbs and girdles
- Circulatory System: Evolution of heart and aortic arches
- Urinogenital System: Kidney and excretory ducts

Unit: III
- Nervous System: General plan of brain and spinal cord
- Ear and Eye: structure and function
- Gonads and genital ducts

Unit: IV
- Digestion and absorption of dietary components
- Physiology of heart, cardiac cycle and ECG
- Blood Coagulation
- Respiration: mechanism and control of breathing

Unit: V
- Excretion: Physiology of excretion, osmoregulation
- Physiology of muscle contraction
- Physiology of nerve impulse, Synaptic transmission

Zoology
B.Sc. Part – II 2018-19

Paper-II
VERTEBRATE ENDOCRINOLOGY, REPRODUCTIVE BIOLOGY BEHAVIOUR, EVOLUTION AND APPLIED ZOOLOGY

Unit: I
- Structure and function of Endocrine glands
- Hormone receptor
- Biosynthesis and secretion of thyroid, adrenal, ovarian and testicular hormones
- Endocrine disorder of pituitary, thyroid, adrenal and pancreas

Unit:II
- Reproductive cycle in vertebrates
- Menstruation, lactation and pregnancy
- Mechanism of parturition
- Hormonal regulation of gametogenesis

Unit: III
- Evidences of organic evolution.
- Theories of organic evolution.
- Variation, Mutation, Isolation and Natural selection.
- Evolution of Horse

Unit:IV
- Introduction to Ethology: Branches and concept of ethology.
- Patterns of Behaviour, Taxes, Reflexes, Drives and Stereotyped behaviour.
- Reproductive behavioural patterns.
- Drugs and behavior, Hormones and behaviour

Unit:V
- Prawn Culture
- Sericulture
- Apiculture
- Pisciculture
- Poultry keeping
- Elements of Pest Control: Chemical & Biological Control

Zoology
B.Sc. Part II 2018-19
Practical

The practical work in general shall be based on the syllabus prescribed and the students will be required to show the knowledge of the following:
- Study of the representative examples of the different chordates (Classified characters).
- Dissection of various systems of scoliodon-Afferent and Efferent branchial cranial nerves, internal ear.

Alternative methods: By Clay/Thermacol/ Drawing/ Model etc.)
- Simple microscopic technique through unstained or stained permanent mount.
- Study of prepared slides histological, as per theory papers.
- Study of limb girdles and vertebrae of Frog, Varanus, Fowl and Rabbit.
- Identification of species and individual of honey bee.
- Life cycle of honey bee and silkworm.
- Exercise based on Evolution and Animal behavior.

Scheme of Practical Exam   **Time: 3:30hrs**

- Major dissection (Cranial nerves/efferent branchial vessel)   10
- Exercise based on evolution   05
- Exercise based on applied zoology   05
- Exercise based on animal behavior   04
- Spotting-8 (slides-4,bones-2,specimen-2)   16
- Viva   05
- Sessional marks.   05

Zoology
B.Sc. Part III **2018-19**
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, Murcury, 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 breverages, bioleaching.

Unit:V (Medical Zoology)
- Brief introduction to pathogenic microorganisms, Ricketssia, Spirochaetes, AIDS and Typhoid
- Brief account of life history & pathogenicity of the following pathogens with reference to man: prophylaxis & treatment
- Pathogenic protozoan's- Entamoeba, Trypanosome & Plasmodium
- Pathogenic helminthes- Schistosoma
- Nematode pathogenic parasites of man
- Vector insects

Zoology
B.Sc. Part III 2018-19
Paper II

GENETICS, CELL PHYSIOLOGY, BIOCHEMISTRY, BIOTECHNOLOGY AND BIOTECHNIQUES

Unit: I (Genetics)
- Linkage & linkage maps, Sex Determination and Sex Linkage
- Gene interaction- Incomplete dominance & Codominance, Supplementary gene, Complementary gene, Epistasis 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 colour 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, Hybridoma, Trasgenic Animals and Gene library)

Unit: V (Biotechniques)
1. Principles & techniques about the faollowing:
    (i) pH meter
    (ii) Colorimeter
    (iii) Microscopy- Light microscopes: Compound, Phase contrast & Electron microscopes
    (iv) Centrifuge
    (v) Separation of biomolecules by chromatography & electrophoresis

B. Sc. Part III 2018-19
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/   06
Population Density/Frequency/relative density
- Bacterial staining   05
- Biochemical experiment   06
- Practical based on Instrumentation (Chromatography/
  pH meter/microscope/centrifuge.   05
- Spotting (5 spots)   10
7   Viva   05
8. Sessional   05

Proposed Syllabus and Structure

For

B.Sc. with Botany

Pt. Ravishankar Shukla University, Raipur

B.Sc.– I (BOTANY) PAPER-I

BACTERIA, VIRUSES, FUNGI, LICHENS AND ALGAE

UNIT-I

VIRUSES: General characteristics, types of viruses based on structure and genetic material. Multiplication of viruses (General account), Lytic and Lysogenic cycle. Economic importance. Structure and multiplication of Bacteriophages. General account of Viroids, Virusoids, Prions, and Cyanophages. Mycorrhiza-Types and Significance.

UNIT –II

BACTERIA: General characteristics and classification (on the basis of morphology), fine structure of bacterial cell, Gram positive and Gram negative bacteria, mode of nutrition and reproduction vegetative, asexual and recombination (Conjugation, transformation and transduction), Economic importance. Microbial Biotechnology, *Rhizobium, Azatobactor, Anabena.*

UNIT-III

FUNGI: General account of habit and habitat, structure (range of thallus organization), cell wall composition, nutrition and reproduction in fungi. Heterothallism and Parasexuality. Outlines of classification of fungi. Economic importance of fungi. Life cycles of *Saprolegnia, Albugo,, Aspergillus, Peziza, Agaricus, Ustilago, Puccinia, Alternaria and Cercospora*. VAM Fungi

UNIT-IV

ALGAE: Algae: General characters, range of thallus organization, Gaidukov phenomenon, reproduction, life cycle patterns and economic importance.Classification, Systematic position, occurrence, structure and life cycle of following genera : *Nostoc, Gloeocaspsa, Volvox,, Oedogonium, Vaucheria, Chara, Ectocarpus, Polysiphonia.*

UNIT –V

Lichens- General account, types, structure, nutrition, reproduction and economic importance. Mycoplasma: Structure and importance. Blue Green Algae (BGA) in nitrogen economy of soil and reclamation of Ushar land.Mushroom Biotechnology

Books Recommended:

Dubey R.C. and Maheshwari D.K. *A text book of Microbiology,* S. Chand Publishing, New Delhi

Presscott, L. Harley, J.and Klein, D. *Microbiology*, 7th edition, Tata Mc Graw-Hill Co.New Delhi.

Sharma P.D., *Microbiology and Plant pathology,* Rastogi Publication. New Delhi.

Alexopolous, C.J. Mims, C.W. and Blackwell, MM. *Introduction to Mycology,* John Wiley & Sons.

Dubey H.C. *An Introduction to Fungi,* Vikas Publishing, New Delhi

Mehrotra R.S. & Agrawal A., *Plant Pathology,* Tata McGraw, New Delhi

Sharma P.D. *Plant Pathology*, Rastogi Publishers, Meruth.

Sristava, H.N. *Fungi*, Pradeep Publications, Jalandhar

Webster, J. & Weber, R. *Introduction to Fungi*, Cambridge University Press, Cambridge

Kumar H.D. *Introduction to phycology*, Aff. East-west Press, New Delhi

Lee RE, *Phycology*, Cambridge University Press U.K.

Srivastava, H.N., *Algae*, Pradeep Publications, Jalandhar

Pandey S.K. Quick *Concept of Botany*, Lambert Academic publishing, Germany

Pandey S.N., Mishra S,P. & Trivedi P.S. *A Text Book of Botany* (Vol.-I), Vikas Publishing, New Delhi
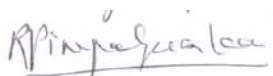
Singh, Pandey and Jain, *A Text book of Botany,* Rastogi Publication, Meerut.

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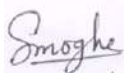
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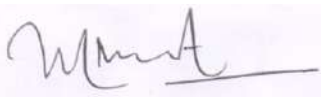
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B.Sc.-I (BOTANY) PAPER –II

(BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS AND PALAEOBOTANY)

UNIT –I

BRYOPHYTA: General characteristics, affinities, range of thallus organization, general classification and economic & ecological importance, Systematic position, occurrence, morphology anatomy and reproductive structure in *Riccia, Marchantia, Pellia, Anthoceros, Funaria.* Vegetative reproduction in Bryophytes, Evolution of sporophytes.

UNIT-II

PTERIDOPHYTES: General characteristics, affinities, economic importance and classification, Heterospory and seed habit, stellar system in Pteridophytes, Aposory and apogamy, Telome theory, *Azolla* as Biofertilizer.

UNIT-III

Systematic position, occurrence. Morphology, anatomy and reproductive structure of *Psilotum, Lycopodium, selaginella, Equisetum, Marsilea.*

UNIT-IV

Gymnosperm: General characteristics, affinities, economic importance and classification, Morphology, anatomy and reproduction in *Cycas, Pinus* and *Ephedra.*

UNIT-V

PALAEOBOTANY: Geological time scale, types of fossils and fossilization, Rhynia, study of some fossil gymnosperms. *Lygenopteris*

Books Recommended:

Parihar, N.S. *The Biology and Morphology of Pteridophytes,* Central Book Depot, Allahabad.

Parihar,N.S. *An introduction to Bryophyta Vol.I:Bryophytes* Central Book Depot, Allahabad.

Sambamurty,AVSS, *A textbook of Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany*, IK International Publishers.

Pandey SN, Mishra SP and Trivedi PS *A text Book of Botany (Vol.II)*, Vikas Publishing, New Delhi

Bhatanagar, SP and Moitra, A. *Gymnosperm*, New Age International (P) Ltd., Publishers, New Delhi

Biswas C. and Johri BM, *The Gymnosperms*, Springer-Verlag, Germany.

Srivastava, HN, *Palaeobotany*, Pradeep Publications Jalandhar

Srivastava, HN, Bryophyta, Pradeep Publications Jalandhar

Singh, Pandey and Jain, *A Text Book of Botany*, Rastogi Publication, Meerut

Sristava, HN, *Fundamentals of Pteridophytes,* Pradeep Publications, Jalandhar

B.Sc. I (BOTANY)

PRACTICAL

Study of external (Morphorgical) and internal (microscopic/anatomical) features of representative gerera given in the theory.

1. Algae: Gloeocapsa, Scytonema, Gloeotrichia, Volvox, Oedogonium, Vaucheria, Chara, Ectocarpus, Sargassum, Batrachosperrmum
2. Gram staining
3. Fungi: Albugo, Aspergillus, Peziza, Agaricus, Puccinia, Alternaria and Cercospora
4. Bryophyta: Riccia, Marchantia, Pellia, Anthoceros, Sphagnum, Funaria
5. Pteridophyta: Lycopodium, Selaginella, Equsetum, Marsilea.
6. Gymnosperm: Cycas, Pinus, Epherda.

PRACTICAL SCHEME

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

1.	Algae/Fungi/Gram Staining	10
2.	Bryophyta/Pteridophyta	10
3.	Gymnosperm	10
4.	Spotting	10
5.	Viva-Voce	05
6.	Sessional	05
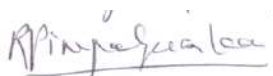
(Dr. J.N. Verma)   (Dr. Rekha Pimpalgaonkar)   (Dr.Ranjana Shristava)

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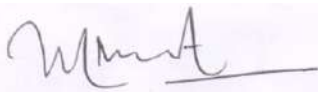
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B.Sc.–II (BOTANY) PAPER-I

(PLANT TAXONOMY, ECONOMIC BOTANY, PLANT ANATOMY AND EMBRYOLOGY)

UNIT-I

Bentham and Hooker system of classification.Binomial Nomenclature, International Code of Nomenclature for Algae, Fungi, and plants (IUCN), Typification, numerical Taxonomy and chemotaxonomy. Preservation of Plant material and Herbarium techniques.Important botanical gardens and herbaria of India, Kew Botanical garden, England.

UNIT-II

Systematic position, distinguishing characters and economic importance of the following families, Ranunculaceae, Magnoliaceae, Brassicaeae, Rosaceae, Papaveraceae, Caryophyllaceae, Rutaceae, Cucurbitaceae, Apiaceae, Rubiaceae, Apocynaceae, Asclepiadaceae, Solanaceae, Malvaceae, Convolvulaceae, Orchidaceae, Acanthaceae, verbenaceae, Lamiaceae, Asteraceae, Fabaceae, Euphorbiaceae, Poaceae and Liliaceae.

UNIT-III

Economic Botany: Botanical name, family, part used and uses of the following economically important plants, fiber yielding plants; Cotton, jute, sun, hemp, coir.Timber yielding plants: Sal, Teak, Shisham and Pine.Medicinal plants: Kalmegh, Ashwangandha, Ghritkumari, Giloy, Brahmi, sarpgandha, ---of medicinal plants of C.G. Food plants: Pearl millet, Buck of wheat, Sorghum, Soyabean, gram, Ground nut, Sugarcane and Potato.Fruit plants: Pear, Peach, Litchi. Spices: Cinnamon, Turmeric, Ginger, Asafoetida and Cumin. Beverages : Tea, Coffee Rubber Cultivation of important flowers: Chrysanthemum, Dahelia, Biodiesel plants Jatropha, Pongamia Ethnobotany in context of Chhattisgarh.

UNIT-IV

Plant Anatomy: Root and shoot apical meristems theories of root and shoot apex organization, permanent tissues, anatomy of root, stem and leaf of dicot and monocot, secondary growth in root and stem, Anatomical anomalies in the primary structure of stems (Nyctanthes, Boerhaavia, Casuarina), Anamolous secondary growth in Dracaena, Bignonia, Laptadenia.
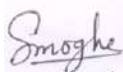
UNIT-V

Embryology: Flower as a reproductive organ, anther, microsporogenesis, types of ovules, megasporogenesis, development of male and female gametophyte, pollination, mechanisms, self incompatibility, fertilization, endosperm, embryo, polyembryonoy, apomixes and parthenocarpy.

Books Recommended:

Singh, Pandey,Jain. *Diversity and Systematics of Seed Plants*, Rastogi Publications Merrut

Sharma OP, *Plant Taxonomy,* Tata Mc Graw Hill, New Delhi

Pandey BP, *Taxonomy of Angiosperms,* S. Chand Publishing, New Delhi

Pandey, BP, *Plant Anatomy,* S.Chand Publishing, New Delhi

Pandey, BP, *Economic Botany,* S.Chand Publishing, New Delhi

Bhojwani, SS and Bhatanagar SP, *Embryology of Angiosperm*, Vikas Publication House, New Delhi

Singh, Pandey, Jain, *Embryology of Angiosperms*, Rastogi Publication, Meerut

Sharma, V, Alum, A. *Ethnobotany*, Rastogi Publications, Meerut

Tayal, MS *Plant Anatomy*, Rastogi Publication, Meerut
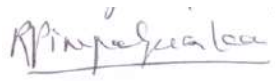
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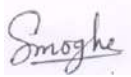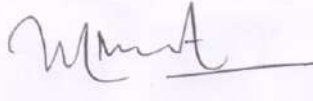
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B.Sc.-II (BOTANY) PAPER-II

(ECOLOGY AND PLANT PHYSIOLOGY)

UNIT-I

Introduction and scope of ecology, environmental and ecological factors, Soil formation and soil profile, Liebig's law of minimum, Shelford's law of tolerance, morphological and anatomical adapataions in hydrophytes, xerophytes and epiphytes.

UNIT-II

Population and community characteristics, Raunkiaer's life forms, population interactions (e.g. Symbiosis, Amensalism etc.), succession, ecotone and edge effect, ecological niches, ecotypes, ecads, keystone species

Concept of ecosystem, trophic levels, flow of energy in ecosystem, food chain and food web, concept of ecological pyramids

Biogeochemical cycles:carbon cycle, nitrogen cycle and phosphorus cycle

UNIT-III

Plant water relations: Diffusion, permeability, osmosis, imbibitions, plasmolysis, osmotic potential and water potential, Types of soil water, water holding capacity, wilting, Absorption of water, theories of Ascent of sap, Mineral nutrition and absorption, Deficiency symptoms, Transpiration, stomatal movement, significance of transpiration, Factors affecting transpiration, guttation.

UNIT-IV

Photosynthesis: Photosynthetic apparatus and pigments, light reaction mechanism of ATP synthesis. C3, C4 CAM pathway of carbon reduction, photorespiration, factors affecting photosynthesis.

Respiration: Aerobic and anaerobic respiration, Glycolysis, Kreb's cycle, factors affecting respiration, R.Q.

UNIT-V

Plant growth hormones: Auxin, Gibberellin, Cytokinin, Ethylene and Abscissic acid. Physiology of flowering, Florigen concept, Photoperiodism and Vernalization. Seed dormancy and germination, plant movement.

Books Recommended:

Koromondy, EJ. *Concepts of Ecology,* Prentice Hall, USA

Singh, JS Singh SP and Gupta SR. *Ecology and Environmental Science and Conservation*, S. Chand Publishing, New Delhi

Sharma, PD. *Ecology and Environment,* Rastogi Publications, Merrut

Hopkins, WG and Huner, PA. *Introduction to Plant Physiology,* John Wiley and Sons.

Pandey SN and Sinha BK, *Plant Physiology,* Vikas Publishing, New Delhi

Taiz, L and Zeiger. E. *Plant Physiology,* 5th edition, Sinauer Associates Inc. M.A, USA

Srivastava, HS *Plant Physiology and Biotechnology*, Rastogi Publications, Meerut

B.Sc. II (BOTANY)

Practical

1. Taxonomy: Detailed description and identification of locally available plants of the families as prescribed in the theory paper.
2. Economic Botany: Identification and comment on the plants and plant products belonging to different economic use categories
3. Preparation of Herbarium of local wild plants.
4. Quantitative vegetation analysis of a grassland ecosystem.
5. Anatomical characteristics of hydrophytes and xerophytes.
6. Demonstration of root pressure.
7. Demonstration of transpiration.
8. Demonstration of evolution of O_2 in photosynthesis, factors affecting of photosynthesis.
9. Comparison of R.Q. of different respiratory substrates.
10. Demonstration of fermentation.
11. Determination of BOD of a water body.
12. Demonstration of mitosis.

PRACTICAL SCHEME

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

1.	Anatomy	08
2.	Economic Botany	04
3.	Physiology	08
4.	Ecology	10
5.	Spotting	10
6.	Viva-Voce	05
7.	Project Work/ Field Study	10
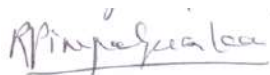
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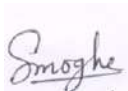
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B.SC.-III (BOTANY) PAPER –I

(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, Spectrophotometere

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
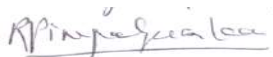
Sharma AK, *Text book of Biostatistics,* Discovery Publishing House Pvt. Ltd.

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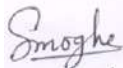
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B.Sc.-III (BOTANY) PAPER –II

(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.-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
5.	Viva-Voce	05
6.	Sessional	05
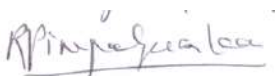
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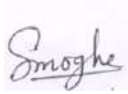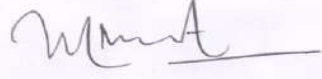
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B. Sc. Bioscience

Scheme of Examination

B.Sc. I Year				
Paper	**Name of Paper**	**Max Marks**	**Total Marks**	**Min Marks**
Paper – I	Cell Biology and Genetics	50	100	33
Paper – II	Biodiversity and Systematics of Plants and Microbes	50		
Practical	Based on Paper - I & - II		50	17
B.Sc. II Year				
Paper – I	Ecology, Environmental Biology, Evolution and Behaviour	50	100	33
Paper – II	Biodiversity and Systematics of Invertebrates and Vertebrates	50		
Practical	Based on Paper - I & - II		50	17
B.Sc. III Year				
Paper – I	Plant and Animal Physiology, Development and Biochemistry	50	100	33
Paper – II	Biostatistics, Computer and Bioinformatics	50		
Practical	Based on Paper - I & - II		50	17

Syllabus

B.Sc. I Year

Paper – I	Cell Biology and Genetics
Unit – I	Cell wall and Cell membrane; Structural components, organization and function. Cytoskeletons. Structure and function of Nucleus, nuclear pore complex, Nucleolus and other subnuclear organelles.
Unit – II	Structure and function of Endoplasmic reticulum, Golgi bodies, Lysosomes, Peroxisomes, Ribosomes, Chloroplast and Mitochondria.
Unit – III	Structure and organization of chromosomes. Cell division in prokaryotes and eukaryotes. Structure, types and function of DNA and RNA. Genetic code. Programmed cell death and Apoptosis. Identification of the genetic material: Experiments of Griffith.
Unit – IV	Molecular mechanism of recombination: Homologous and site specific recombination. Recombination in bacteria: Conjugation, ransformation, Transduction. Basic concept of genetics. Mendelian Genetics: Principle of segregation and independent assortment, monohybrid, dihybrid and trihybrid cross, epistasis.
Unit – V	Mutation: Point mutations, base substitutions, base addition and deletion, Mutant phenotypes and their detection, Spontaneous mutation, Induced mutations, molecular mechanisms of mutations. Concept of transgenic animals and plants.

Paper – II	Biodiversity and Systematics of Microbes and Plants
Unit – I	Bacteria: General characteristics, Structure, nutrition, reproduction. Classification of bacteria- outline of the prokaryotes as per Bergey's Manual 2001. Economic importance of bacteria Virus: General characteristics, structure and classification of viruses. Bacteriophage: λ phage, structure and life cycle. Plant virus: TMV structure and life cycle. Animal virus: HIV structure and life cycle.
Unit – II	Algae: General characters, classification and economic importance, important features and life history of Chlorophyceae; Volvox, Oedogonium. Xanthophycae; Vaucheria. Pheophyceae; Sargusum. Rhodophycae; Polysiphonia.
Unit – III	Fungi: General characters, classification and economic importance, important features and life history of Mastogomycotina; Pythium, Zygomycotina; Mucor. Ascomycotina; Peziza. Basidiomycotina; Agaricus. Deuteromycotina; Colletotrichum. General characters of Lichen.
Unit – IV	Bryophyta: Structure, reproduction and classification of Hepaticopsida- Marchantia; Anthocerotopsida- Anthoceros; Bryopsida- Funaria. Pteridophyta: Important characteristics of Psilopsida, Lycopsida, Sphenopsida, Pteropsida, Lycopodium, Selaginella, Pteris and Marsilea.
Unit – V	General feature of Gymnosperm and their classification: Evolution and diversity of gymnosperm. Geological time scale, fossilization and fossil Gymnosperm. Morphology of vegetative and reproductive parts; anatomy of

	roots, stem and leaf, reproduction and life cycle of Pinus, Cycas and Ephedera. Classification of angiosperm: Salient features of the systems proposed by Benthem and Hooker, and Engler and Prantl. General account of the families: Brassicaceae, Malvaceae, Fabaceae, Apiaceae, Acanthaceae, Apocyanaceae, Solanaceae, Euphorbiaceae, Liliacea, and Poacea.

Practical	1. Preparation of temporary smear of salivary gland chromosome of Drosophila.
	2. Identification of mutant phenotypes of Drosophila / Arabidopsis stock maintained in the department.
	3. Bacterial culture liquid and plate for mutation studies.
	4. Study of cell structure and measurement from onion leaf peels: demonstration of staining and mounting methods.
	5. Study of plastids to examine pigment distribution in plants (Cassia / *Lycopersicon capsicum*).
	6. Determination of hill activity in chloroplast of spinach.
	7. Isolation and staining of mitochondria using Janus green.
	8. Isolation of microorganisms from soil, air and water
	9. Microbial culture, staining and identification
	10. Study of specimens of representative examples of different class.
	11. Study of permanent slides of different material of representative examples as per theory syllabus.
	12. Study of disease symptoms in plants.
	13. Isolation of Bacteria from various sources and their identification.
	14. Isolation of Fungi from various sources and their identification.
	15. Examination of fungal flora of different local ponds
	16. Morphology and anatomy of Marchantia and Anthoceros
	17. Morphology and anatomy of Selaginella and Marsilea
	18. Morphology and anatomy of Cycas, Pinus and Ephedra
	19. Study of vegetative and reproductive parts of species belonging to families

Books Recommended	1.	Antherly, A.G., Girton J.R. and Mc Donald, 1999. The Science of Genetics. Saunders College Publishing Co. Forth Worth, USA.
	2.	Buchanan, B.B., Gruissem, W. and Jones, R.L. 2000. Biochemistry and Molecular Biology of Plants. American Society of Plant Physiologists, Maryland, USA.
	3.	David E. Sadava. 1993, Cell Biology: Organelles Structure and Function. Jones and Bartlett Publishers
	4.	Gardeners, J., Simmons, H.J. and Snustad, D.P. 1991. Principles of Genetics (8th Ed.). John Wiley and Sons N.Y.
	5.	Lowey 1991. Cell Structure and Function – Science
	6.	Robertis D. – Cell Biology, Science Publication.
	7.	Sharma, A.K. and Sharma, A. 1999. Plant Chromosome: Analysis, Manipulation and Engineering, Harwood Academic Publishers, Australia.
	8.	Singh, B.P. – Fundamentals of Genetics.
	9.	Snustad, D.P., and Simmons, M.J. 2000. Principles of Genetics (2nd Ed.). John Wiley and Sons. Inc., USA.
	10.	Verma, P.C. And Agrawal , V.K. – Cell Biology, Genetics, Molecular Biology, Evolution & Ecology, S.Chand Publication.
	11.	General microbiology By Pawar and Daginawala
	12.	Microbiology by Pelczar and Reid
	13.	Microbiology by PD Sharma
	14.	Saxena and Sarbhai – A textbook of Botany (Angiosperms)
	15.	Bendre and Kumar – Economic Botany
	16.	Singh and Jain – Taxonomy of Angiosperms
	17.	Pandey, B.P. – Textbook of Botany
	18.	Vashishta, B.R. – Bryophyta
	19.	Vashishta, P.C. – Pteridophyta
	20.	Vashishta, P.C. – Gymnosperms

	Syllabus
	B.Sc. II Year
Paper – I	**Ecology, Environmental Biology, Evolution and Behaviour**
Unit – I	Ecology: Definition, Scope and Importance. Ecological factors: Abiotic and biotic factor. Ecosystem: Types of Ecosystem, Components of ecosystem. Energy flow in the Ecosystem: Energy flow models. Food Chains and Food Web. Ecological pyramids. Ecological succession.
Unit – II	Air pollution: Evolution and composition of atmosphere, Chemical and photochemical reactions in the atmosphere, Air pollutants, Control of air pollution. Water pollution: Sources of water pollution, Hydrologic cycle, water quality standards, Eutrophication and algal blooms.
Unit – III	Industrial pollution: Sources and major pollutants. Bioremediation: Types and techniques. Solid waste management. Environmental impact assessment. Pollution control laws and acts.
Unit – IV	Evolution: Basic concepts. Theories of organic evolution Patterns of evolution: Divergent and convergent evolution, parallel evolution, co-evolution. Evolution in action: Variations, mutations, recombination, ploidy, isolation, Natural selection, Concept of species and speciation. Micro and Macroevolution
Unit – V	Concepts and patterns of behaviour. Instinct and learning: Innate behavior, Learned behaviour and types of learning, Genetic basis of behaviour. Control of behavior: Neural, hormonal and pheromonal. Social organization: Communication, Living in groups, Eusocial organization. Migration, orientation and navigation

Paper – II	**Biodiversity and Systematics of Invertebrates and Vertebrates**
Unit – I	General characters and classification of Invertebrates up to orders with examples emphasizing their biodiversity, economic importance and conservation measures. Protozoa: Plasmodium. Protozoa and diseases. Porifera: Sycon. Coelentrata: Obellia. Helminths: Liver fluke
Unit – II	Annelida: Nereis, Metamorphism and Trocophore larvae. Arthropoda: Prawn. Mollusca: Pila. Echinodermata: Star fish, Echinoderm larvae. Hemichordata: Balanoglossus
Unit – III	Chordata: Origin and Classification. Protochordata; Classification up to orders, interrelationships, Urochordates; Amphioxus Agnatha: Petromyzon, Fishes: skin and scales, Migration and Parental care
Unit – IV	Amphibia : Parental care, Neoteny. Reptiles : Extinct reptiles, poisonous and non-poisonous snakes, poisonous apparatus and snake venom

Unit – V	Birds: Migration, Ratitae, Flight adaptation. Mammals; Aquatic mammal, Dentition in mammal, Prototheria and Affinities

Practical	1. Determination of density, abundance and frequency of biota from grasslands
	2. Determination of temperature and pH of the industrial effluents.
	3. Determination of phenopthalein, methyl orange and total alkalinities and free and total CO_2 of industrial effluents
	4. Determination of phosphate, sulphate, nitrate, nitrite and ammonia nitrogen of industrial effluents.
	5. Determination of DO of industrial effluents
	6. Collection and identification of plants and animal species from different industrial effluent channels.
	7. Study of specimens of representative examples of different phylum (Classification up to order).
	8. Study of permanent slides of different sections of representative examples as per theory syllabus.
	9. Microscopic techniques including unstained and stained permanent mount of animal material.
	10. Examination of local fauna of different ponds.
	11. Phototactic behaviour in *Mimosa pudica* and fish
	12. Learning behaviour of cockroach, mice
	13. Reasoning behaviour of mouse and rat
	14. Study of representative examples of the different chordates (classification and characters)
	15. Simple microscopic techniques through unstained and stained permanent mounts
	16. Study of histological slides in accordance with the theory papers.
	17. Study of osteology of different chordates

Books Recommended	1. Odum EP: Ecology
	2. PD Sharma: Fundamentals of Ecology
	3. Moody: Introduction to Evolution
	4. Paul L. Bishop - Pollution Prevention: Fundamentals and Practice
	5. Marquita K. Hill - Understanding Environmental Pollution: A Primer
	6. Daniel Vallero - Fundamentals of Air Pollution, Fourth Edition
	7. Kenneth M. Vigil - Clean Water: An Introduction to Water Quality and Pollution Control
	8. W.Wesley Eckenfelder - Industrial Water Pollution Control
	9. A.G. Clarke - Industrial Air Pollution Monitoring - Gaseous and particulate emissions
	10. Harry M. Freeman - Industrial Pollution Prevention Handbook
	11. Alcock (2009): Animal Behaviour: An Evolutionary Approach
	12. Grier (1984): Biology of Animal Behaviour
	13. Lorenz (1981): The Foundation of Ethology
	14. Manning & Dawkins (1998): An Introduction to Animal Behaviour
	15. Mcfarland (1985): Animal Behaviour: Psychology, Ethology and Evolution
	16. Scott (2005): Essential Animal Behaviour
	17. Anil Kulshreshtha: Unified Practical Zoology

	18. Michael Stachowitsch, Sylvie Proidl (Illustrator): The invertebrates: An illustrated glossary 19. L.H. Hyman: The Invertebrata vol I & II 20. Rouer and Parsons – The Vertebrate Body, Saunders 21. Kotpal: Modern text book of Zoology: Invertebrates (11th ed. 2016 Rastogi) 22. Kotpal: Modern text book of Zoology: Vertebrates (4th ed. 2016 Rastogi) 23. Jordan & Verma: Invertebrate Zoology (Reprint 2014, S. Chand) 24. Jordan & Verma: Chordate Zoology (Reprint 2014, S. Chand)

	Syllabus
	B.Sc. III Year
Paper – I	**Plant and Animal Physiology, Development and Biochemistry**
Unit – I	Plant water relations: Importance of water to plant life, Physical properties of water, Diffusion and Osmosis, Ascent of sap, Physiology of stomatal movement. Transpiration. Photosynthesis: light reaction & dark reaction: C3, C4 and CAM metabolism. Respiration: Aerobic and anaerobic respiration, Glycolysis, Fermentation, Krebs cycle, ETC, oxidative phosphorylation.
Unit – II	Nitrogen Metabolism: Biology of nitrogen fixation; Nitrogenase. Structure, function and regulation of Nitrate Reductase and Nitrite Reductase, Assimilation of Ammonia Photomorphogenesis: Photochemical and biochemical properties of phytochrome Phytohormones: Structure, function and applications of Auxin, Gibberlic acid, Cytokinin, Abscisic acid and Ethylene.
Unit – III	Physiology of digestion and absorption of dietary components Physiology of heart, cardiac cycle, ECG and Blood Coagulation Respiration: mechanism and control of breathing
Unit – IV	Excretion: Physiology of excretion, osmoregulation Physiology of muscle contraction Physiology of nerve impulse, Synaptic transmission Endocrine system and physiology of reproduction
Unit – V	Gametogenesis-spermatogenesis and oogenesis; Mechnism of Fertilization in invertebrates and vertebrates; Types and patterns of cleavage; Blastulation and fate map construction in chick; Gastrulation; Competence, determination, differentiation, induction and regeneration In-vitro fertilization, embryo transfer technique, collection and preservation of gametes; parthenogenesis

Paper – II	**Biostatistics, Computer and Bioinformatics**
Unit – I	Nature and scope of statistical methods and their limitations, Data compilation, classification, tabulation and applications in life sciences, graphical representation, computation of mean, median, mode and standard deviation.
Unit – II	Sampling methods – simple random, stratified, systemic and cluster sampling procedures, analysis of variance, Tests of significance based on t and chi-square.
Unit – III	Classification of computers – computer generation, low, medium and high level languages, software and hardware, operating systems, compilers and interpreters, personal, mini, main frame and super computers. Computer memory and its types, Input-output devices, secondary storage media.
Unit – IV	Application software: word-processing software, and spreadsheet. Microsoft excel: Data entry, graphs, formulas and functions Computer networks: Basic concepts on LAN and WAN and internet systems, search engines

Unit – V	Bioinformatics and its relation with molecular biology. Tools (FASTA, BLAST, BLAT, RASMOL), databases (GENBANK, Pubmed, PDB) and software (RASMOL). Data generation; Generation of large scale molecular biology data. (Through Genome sequencing, Protein sequencing, Gel electrophoresis and microarray). Applications of Bioinformatics

Practical	1. Measurement of osmotic potential of cell sap by plasmolytic method.
	2. Determination of osmotic potential of cell sap by gravimetric method.
	3. Estimation of Nitrate reductase activity: *In-vivo* and *In-vitro*.
	4. Estimation of osmotic potential of cell sap by Chardakows method.
	5. Extraction and estimation of chlorophyll-a, chlorophyll-b and total chlorophyll content.
	6. Bioassay of Auxin using wheat coleoptiles.
	7. Bioassay of Cytokinin by using cucumber cotyledons.
	8. To determine Percent germination, Germination index, Mean daily germination and Peak value of given seed lots.
	9. Microscopic examination & preparation of tissues in selected animal models
	10. Virtual dissection of alimentary canal in mammalian and non-mammalian models (Alternative methods: By Clay/Thermacol/drawing/Model etc.)
	11. Qualitative and quantitative determination of digestive enzymes
	12. Virtual dissection of cranial nerves in selected animal models (Alternative methods: By Clay/Thermacol/drawing/Model etc.)
	13. Chemical analyses of urine
	14. Study of structure of egg of hen and vital staining of the embryo
	15. Window preparation in hen egg
	16. Whole mount preparations of chick embryos
	17. Types of egg-study
	18. Live gametes under microscope
	19. Living chick embryo-observations
	20. Construction of frequency distribution curve.
	21. Computation of measures of central tendency and dispersion.
	22. Exercises on presentation of data.
	23. Hypothesis testing: *t-test*, χ^2*-test.*
	24. Study of different components of a computer system.
	25. Exercise on word processing package (MS Word)
	26. Exercise on Excel package.
	27. Exercise on Internet use
	28. Primer designing and specificity verification
	29. Sequence identification, sequence similarity match or sequence BLAST
	30. Identification of conserved regions of following genes and proteins and determination of homology [sequance similarity] in different plants and animals: a- Gene sequence of 18SrRNA, Actin, Tubulin, Superoxide dismutase, Ctalase b- Late embryogenic abundant protein [LEA], Heat shock proteins

		[HSP] and peroxiredoxins [Prx]
	31.	Identification of SNPs & SNP database

Books Recommended	1.	Fosket DF: Plant Growth & Development
	2.	Leopold AC & Kriedemann PE: Plant Growth & Development
	3.	L Taiz & E Zeiger: Plant Physiology
	4.	BB Buchanan, W Gruissem & RL Jones Biochem. & Molecular Biology of Plants
	5.	MB Wilkins: Advanced Plant Physiology
	6.	JA Hopkins: Introduction to Plant Physiology
	7.	FB Salisburry & CW Ross: Plant Physiology
	8.	Animal Physiology: Mechanisms and Adaptations - Roger Eckert, David J. Randall, George Augustine, Published by W.H. Freeman, 1988
	9.	Textbook of Medical Physiology - Arthur C. Guyton, Published by Saunders, 2000
	10.	Review of Medical Physiology - William F. Ganong, Published by McGraw-Hill Professional, 2005
	11.	Human Physiology – C.C. Chatterjee, Published by Medical Allied Agency, Kolkata, 2002
	12.	Balinsky: Introduction to Embrology, CBS College Publishers
	13.	Berril, NJ: Developmental Biology, Tata-McGraw Hill
	14.	Davenport: An outline of animal developmental, Addison-Werley
	15.	Gilbert SF: Developmental Biology, Sinauer Associates, Massachusetts
	16.	Grant: Biology of Development Systems
	17.	Subramanyam, T: Developmental Biology, Narosa Publising House
	18.	Rao, KV: Developmental Biology: A Modern Synthesis, Oxford-IBH Publishers
	19.	Campbell RC: Statistics for biologists
	20.	Snedecor GW & Cochran WG: Statistical Methods
	21.	Sokal RR & Rohlf FJ: Introduction to Biostatistics
	22.	Zar JH: Biostatistical Analysis
	23.	Khan and Khanum: Fundamentals of Biostatistics
	24.	Shrivastava Chetan: Fundamentals of Information Technology
	25.	S.K. Bajpai & D.S. Yadav: Introduction to Computer & C Programming
	26.	S. Banerjee: MS Word –2000 Thumb Rules & Details
	27.	S. Govindrajan, M. Chandrashekaran, A.A. Haq, T.R. Narayanan: Introduction to Computer Science
	28.	Gupta Kamlesh, Chawla P.K.: An Introduction to Computer Science
	29.	Animesh K. Datta (2007) "Basic Biostatistics and it's application"First Edition, New Central Book Agency, Ltd, Kolkata.
	30.	Baxevanis, A.D. and Francis Ouellellette, B.F. (1998) "Bioinformatics–a practical guide"
	31.	Mount, D. (2004) "Bioinformatics: Sequence and Genome Analysis"; Cold Spring Harbor Laboratory Press, New York.
	32.	Sharma, V. Munjal, A. and Shankar, A. (2008) "A text book of Bioinformatics" first edition, Rastogi Publication, Meerut – India.

Scheme & Syllabus

Subject: Electronics

**Approved at Central Board of Studies meeting held at
School of Studies in Electronics & Photonics
on 11ᵗʰ June ,2018**
[Constituted under Chhattisgarh VishwavidyalayaAdhiniyam 1973 Clause 34 (A)]

**Jointly by
School of Studies in Electronics & Photonics
Pt. Ravishankar Shukla University
Raipur (C.G.)
&
Office of Commissioner
Department of Higher Education
Govt. of Chhattisgarh, IndrāvatiBhavan,
Naya Raipur (C.G.)**

Yearly Syllabus for Undergraduates
As recommended by Central Board of Studies of Electronics
For approval of Kuladhipati, Governor of Chhattisgarh
Session 2018-19
July 2018 onwards
Class: B.Sc. Electronics

Scheme of Examination

Paper Code	Course Opted	Title of Course	Theory	Practical	Grand Total	Minimum Passing Marks
First Year						
ELB-101	Core Course	Network Analysis And Analog Electronics	50		100	33
ELB-102	Core Course	Linear and Digital Integrated Circuits	50			
ELB-103P	Core Course Practical/Tutorial	Networks Analysis and Analog Electronics Lab	25	50	50	17
ELB-104P	Core Course Practical/Tutorial	Linear and Digital Integrated Circuits Lab	25			
Second Year						
ELB-201	Core Course	Communication Electronics	50		100	33
ELB-202	Core Course	Microprocessor and Microcontrollers	50			
ELB-203P	Course Practical/Tutorial	Communication Electronics Lab	25	50	50	17
ELB-204P	Course Practical/Tutorial	Microprocessor& Microcontroller Lab	25			
Third Year						
EL301	**Skill Enhancement Course**	Industrial Electronics	50		100	33
EL302	**Skill Enhancement Course**	Mobile Application Programming and Introduction to VHDL	50			
EL303P	**Skill Enhancement CoursePractical**	Industrial Electronics Lab	25	50	50	17
EL304P	**Skill Enhancement Course Practical**	Mobile Application Programming and Introduction to VHDL Lab	25			

Syllabus
<u>B.Sc. Part I</u>
ELECTRONICS
Paper-I

ELB-101: NETWORK ANALYSIS AND ANALOGELECTRONICS
Theory: **Maximum Marks 50**

Unit-1

Basic Circuit Concepts: Voltage and Current Sources, Review of Resistors, Inductors, Capacitors. Circuit Analysis: Kirchhoff's Current Law (KCL), Kirchhoff's Voltage Law (KVL),

AC Circuit Analysis: Sinusoidal Voltage and Current, Definition of Instantaneous, Peak,Peak to Peak, Root Mean Square and Average Values. AC applied to Series RC and RL circuits: Impedance of series RC & RL circuits.AC applied to Series and parallel RLC circuit, Series and Parallel Resonance, condition for Resonance, Resonant Frequency, Bandwidth, and significance of Quality Factor (Q).

Passive Filters: Low Pass, High Pass.

Network Theorems: Principal of Duality, Superposition Theorem, Thevenin's Theorem,Norton's Theorem, Reciprocity Theorem, Millman's Theorem, Maximum Power Transfer Theorem. AC circuit analysis using Network theorems.

Unit-2

Junction Diode and its applications: PN junction diode (Ideal and practical)-constructions, Formation of Depletion Layer, Diode Equation and I-V characteristics. Idea of static and dynamic resistance, dc load line analysis, Quiescent (Q) point. Zener diode, Reverse saturation current, Zener and avalanche breakdown. Rectifiers- Half wave rectifier, Full wave rectifiers (center tapped and bridge), circuit diagrams, working and waveforms, ripple factor and efficiency. Filter-Shunt capacitor filter, its role in power supply, output waveform, and working. Regulation- Line and load regulation, Zener diode as voltage regulator, and explanationfor load and line regulation.

Unit-3

Bipolar Junction Transistor: CE, CB Characteristics and regions of operation, Transistor biasing, DC load line, operating point, thermal runaway, idea about stability and stability factor. Voltage divider bias, circuit diagrams and their working.

Field Effect Transistors: JFET, Construction, Working and Characteristics. MOSFET, Construction, Working and Characteristics.

Power Devices: UJT, Construction, Working and Characteristics. SCR, Diac, Triac, Construction, Working and Characteristics and Applications.

Unit-4

Amplifiers: Transistor biasing and Stabilization circuits- Fixed Bias and VoltageDivider Bias. Thermal runaway, stability and stability factor S. Transistor as a two port network, h-parameter equivalent circuit. Small signal analysis of single stage CE amplifier. Input and Output impedance, Current and Voltage gains. Class A, B and CAmplifiers.

Cascaded Amplifiers: Two stage RC Coupled Amplifier and its Frequency Response.

Unit-5

Feedback in Amplifiers: Concept of feedback, negative and positive feedback, advantages of negative feedback (Qualitative only).

Sinusoidal Oscillators: Barkhausen criterion for sustained oscillations. Phase shift,Weins bridge, Crystal andColpitt's oscillator. Determination of Frequency and Condition of oscillation.

Reference Books:

[1] Electric Circuits, S. A. Nasar, Schaum's outline series, Tata McGraw Hill (2004)

[2] Electrical Circuits, M. Nahvi& J. Edminister, Schaum's Outline Series, Tata McGraw-Hill (2005)

[3] Electrical Circuits, K.A. Smith and R.E. Alley, 2014, Cambridge University Press

[4] Network, Lines and Fields, J.D.Ryder, Prentice Hall of India.

[5] Electronic Devices and Circuits, David A. Bell, 5th Edition 2015, Oxford University Press.

[6] Electronic Circuits: Discrete and Integrated, D.L. Schilling and C. Belove, Tata McGraw Hill

[7] Electrical Circuit Analysis, Mahadevan and Chitra, PHI Learning

[8] Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6thEdn., Oxford University Press.

[9] J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001)

[10] J. J. Cathey, 2000 Solved Problems in Electronics, Schaum's outline Series, Tata McGraw Hill (1991)

Paper- II

ELB-102: LINEAR AND DIGITAL INTEGRATEDCIRCUITS

Theory: **Maximum Marks 50**

Unit-1

Operational Amplifiers (Black box approach): Characteristics of an Ideal andPractical Operational Amplifier (IC 741), Open and closed loop configuration, Frequency Response. CMRR. Slew Rate and concept of Virtual Ground.

Applications of Op-Amps: (1) Inverting and non-inverting amplifiers, (2) Summingand Difference Amplifier, (3) Differentiator, (4) Integrator, (5) Wein bridge oscillator, (6) Comparator and Zero-crossing detector, and (7) Active low pass and high pass, Butterworth filter (1st order only).

Unit-2

Number System and Codes: Decimal, Binary, Octal and Hexadecimal number systems,base conversions. Representation of signed and unsigned numbers, BCD code. Binary, octal and hexadecimal arithmetic; addition, subtraction by 2's complement method, multiplication.

Logic Gates and Boolean algebra: Truth Tables of OR, AND, NOT, NOR, NAND,XOR, XNOR, Universal Gates, Basic postulates and fundamental theorems of Boolean algebra.

Unit-3

Combinational Logic Analysis and Design: Standard representation of logic functions (SOP and POS), Minimization Techniques (Karnaugh map minimization up to 4 variables for SOP).Arithmetic Circuits: Binary Addition. Half and Full Adder.Half and Full Subtractor, 4-bit binary Adder/Subtractor.

Data processing circuits: Multiplexers, De-multiplexers, Decoders, Encoders. Clock and Timer (IC 555): Introduction, Block diagram of IC 555, Astable and Monostablemultivibrator circuits.

Unit-4

Sequential Circuits: SR, D, and JK Flip-Flops. Clocked (Level and Edge Triggered)Flip-Flops. Preset and Clear operations. Race-around conditions in JK Flip-Flop.Master-slave JK Flip-Flop.

Shift registers: Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits).

Counters (4 bits): Ring Counter. Asynchronous counters, Decade Counter Synchronous Counter.

Unit-5

D-A and A-D Conversion: 4 bit binary weighted and R-2R D-A converters, circuit and working, Accuracy and Resolution. A-D conversion characteristics, successive approximation ADC. (Mention of relevant ICs for all).

Reference Books:

[1] OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall

[2] Operational Amplifiers and Linear ICs, David A. Bell, 3rd Edition, 2011, Oxford University Press.

[3] Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed., 2011, Tata McGraw

[4] Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, 2009, PHI Learning Pvt. Ltd.

[5] Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.

[6] Digital Systems: Principles & Applications, R.J.Tocci, N.S.Widmer, 2001, PHI Learning.

[7] Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994)

[8] R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw- Hill (1994)

ELECTRONICS LABORATORY
ELB 103P: NETWORK ANALYSIS AND ANALOG ELECTRONICS LAB
(Hardware and Circuit Simulation Software)   **Max.Marks:25**

The scheme of practical examination will be as follows-

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

AT LEAST 06 EXPERIMENTS FROM THE FOLLOWING BESIDES #1

1. To familiarize with basic electronic components (R, C, L, diodes, transistors), digital Multimeter, Function Generator and Oscilloscope.

2. Measurement of Amplitude, Frequency & Phase difference using Oscilloscope.

3. Verification of (a) Thevenin's theorem and (b) Norton's theorem.

4. Verification of (a) Superposition Theorem and (b) Reciprocity Theorem.

5. Verification of the Maximum Power Transfer Theorem.

6. Study of the I-V Characteristics of (a) p-n junction Diode, and (b) Zener diode.

7. Study of (a) Half wave rectifier and (b) Full wave rectifier (FWR).

8. Study the effect of (a) C- filter and (b) Zener regulator on the output of FWR.

9. Study of the I-V Characteristics of UJT and design relaxation oscillator..

10. Study of the output and transfer I-V characteristics of common source JFET.

11. Study of Fixed Bias and Voltage divider bias configuration for CE transistor.

12. Design of a Single Stage CE amplifier of given gain.

13. Study of the RC Phase Shift Oscillator.

14. Study the Colpitt`s oscillator.

Reference Books:

1. Electrical Circuits, M. Nahvi and J. Edminister, Schaum's Outline Series, Tata McGraw-Hill (2005)

2. Networks, Lines and Fields, J.D.Ryder, Prentice Hall of India.

3. J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001)

4. Allen Mottershead, Electronic Devices and Circuits, Goodyear Publishing Corporation.

ELECTRONICS LAB
ELB 104P: LINEAR AND DIGITAL INTEGRATED CIRCUITS LAB
Max.Marks:25

At least 04 experiments each from section A, B and C

Section-A: Op-Amp. Circuits (Hardware)

1. To design an inverting amplifier using Op-amp (741,351)for dc voltage of given gain

2. (a) To design inverting amplifier using Op-amp (741,351) & study its frequency response

   (b) To design non-inverting amplifier using Op-amp (741,351) & study frequency response

3. (a) To add two dc voltages using Op-amp in inverting and non-inverting mode

   (b) To study the zero-crossing detector and comparator.

4. To design a precision Differential amplifier of given I/O specification using Op-amp.

5. To investigate the use of an op-amp as an Integrator.

6. To investigate the use of an op-amp as a Differentiator.

7. To design a Wien bridge oscillator for given frequency using an op-amp.

8. To design a circuit to simulate the solution of simultaneous equation and $1^{st}/2^{nd}$order differential equation.

9. Design a Butterworth Low Pass active Filter (1st order) & study Frequency Response

10. Design a Butterworth High Pass active Filter (1st order) & study Frequency Response

11. Design a digital to analog converter (DAC) of given specifications.

Section-B: Digital circuits (Hardware)

1. (a) To design a combinational logic system for a specified Truth Table.

   (b) To convert Boolean expression into logic circuit & design it using logic gate ICs.

   (c) To minimize a given logic circuit.

2. Half Adder and Full Adder.

3. Half Subtractor and Full Subtractor.

4. 4 bit binary adder and adder-subtractor using Full adder IC.

5. To design a seven segment decoder.

6. To design an AstableMultivibrator of given specification using IC 555 Timer.

7. To design a MonostableMultivibrator of given specification using IC 555 Timer.

8. To build Flip-Flop (RS, Clocked RS, D-type and JK) circuits using NAND gates.

9. To build JK Master-slave flip-flop using Flip-Flop ICs

10. To build a Counter using D-type/JK Flip-Flop ICs and study timing diagram.

11. To make a Shift Register (serial-in and serial-out) using D-type/JK Flip-Flop ICs.

Section-C: SPICE/MULTISIM simulations for electronic circuits and devices

1. To verify the Thevenin and Norton Theorems.

2. Design and analyze the series and parallel LCR circuits

3. Design the inverting and non-inverting amplifier using an Op-Amp of given gain

4. Design and Verification of op-amp as integrator and differentiator

5. Design the 1st order active low pass and high pass filters of given cutoff frequency

6. Design a Wein`s Bridge oscillator of given frequency.

7. Design clocked SR and JK Flip-Flop`s using NAND Gates

8. Design 4-bit asynchronous counter using Flip-Flop ICs

9. Design the CE amplifier of a given gain and its frequency response.

Reference Books

1. Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed., 2011, Tata McGraw

2. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4^{th}edn., 2000, Prentice Hall

3. R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw- Hill (1994)

4. Digital Electronics, S.K. Mandal, 2010, 1st edition, McGraw Hill

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B. Sc. Part II

ELECTRONICS

Paper I

ELB 201 : COMMUNICATION ELECTRONICS
Theory: Max. Marks :50

Unit-1

Electronic communication: Introduction to communication – means and modes. Needfor modulation. Block diagram of an electronic communication system. Brief idea of frequency allocation for radio communication system in India (TRAI). Electromagnetic communication spectrum, band designations and usage. Channels and base-band signals. Concept of Noise, signal-to-noise (S/N) ratio.

Unit-2

Analog Modulation: Amplitude Modulation, modulation index and frequency spectrum.Generation of AM (Emitter Modulation), Amplitude Demodulation (diode detector), Concept of Single side band generation and detection. Frequency Modulation (FM) and Phase Modulation (PM), modulation index and frequency spectrum, equivalence between FM and PM, Generation of FM using VCO, FM detector (slope detector), Qualitative idea of Super heterodyne receiver

Analog Pulse Modulation: Channel capacity, Sampling theorem, Basic Principles-PAM, PWM, PPM, modulation and detection technique for PAM only, Multiplexing.

Unit-3

Digital Pulse Modulation: Need for digital transmission, Pulse Code Modulation,Digital Carrier Modulation Techniques, Sampling, Quantization and Encoding. Concept of Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), and Binary Phase Shift Keying (BPSK).

Optical Communication: Introduction of Optical Fiber, Block Diagram of optical communication system.

Unit-4

Introduction to Communication and Navigation systems:

Satellite Communication– Introduction, need, Geosynchronous satellite orbits,geostationary satellite advantages of geostationary satellites. Satellite visibility,

transponders (C - Band), path loss, ground station, simplified block diagram of earth station. Uplink and downlink.

Unit-5

Mobile Telephony System – Basic concept of mobile communication, frequency bandsused in mobile communication, concept of cell sectoring and cell splitting, SIM number, IMEI number, need for data encryption, architecture (block diagram) of mobile communication network, idea of GSM, CDMA, TDMA and FDMA technologies, simplified block diagram of mobile phone handset, 2G, 3G and 4G concepts (qualitativeonly).GPS navigation system (qualitative idea only)

Reference Books:

1. Electronic Communications, D. Roddy and J. Coolen, Pearson Education India.

2. Advanced Electronics Communication Systems- Tomasi, 6th edition, Prentice Hall.

3. Modern Digital and Analog Communication Systems, B.P. Lathi, 4th Edition, 2011, Oxford University Press.

4. Electronic Communication systems, G. Kennedy, 3rdEdn., 1999, Tata McGraw Hill.

5. Principles of Electronic communication systems – Frenzel, 3rd edition, McGraw Hill

6. Communication Systems, S. Haykin, 2006, Wiley India

7. Electronic Communication system, Blake, Cengage, 5th edition.

8. Wireless communications, Andrea Goldsmith, 2015, Cambridge University Press

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Paper II
ELB 202 :MICROPROCESSOR ANDMICROCONTROLLER

Theory: **Max. Marks :50**

Unit-1

Microcomputer Organization: Input/Output Devices. Data storage (idea of RAM andROM). Computer memory. Memory organization & addressing. Memory Interfacing. Memory Map.
8085 Microprocessor Architecture: Main features of 8085. Block diagram. Pin-outdiagram of 8085. Data and address buses. Registers. ALU. Stack memory. Program counter.

Unit-2

8085 Programming : Instruction classification, Instructions set (Data transfer includingstacks. Arithmetic, logical, branch, and control instructions). Subroutines, delay loops. Timing & Control circuitry. Timing states. Instruction cycle, Timing diagram of MOV and MVI. Hardware and software interrupts.

Unit-3

8051 microcontroller: Introduction and block diagram of 8051 microcontroller,architecture of 8051, overview of 8051 family, 8051 assembly language programming, Program Counter and ROM memory map, Data types and directives, Flag bits and Program Status Word (PSW) register, Jump, loop and call instructions.

Unit 4

8051 I/O port programming: Introduction of I/O port programming, pin out diagram of8051 microcontroller, I/O port pins description & their functions, I/O port programming in 8051 (using assembly language), I/O programming: Bit manipulation.
8051 Programming: 8051 addressing modes and accessing memory locations usingvarious addressing modes, assembly language instructions using each addressing mode, arithmetic and logic instructions,

Unit 5

8051 programming in C: for time delay & I/O operations and manipulation, for arithmetic and logic operations, for ASCII and BCD conversions.
Introduction to embedded system: Embedded systems and general purpose computersystems. Architecture of embedded system. Classifications, applications and purpose of embedded systems.

Reference Books:

1. Microprocessor Architecture Programming & applications with 8085, 2002, R.S. Goankar, Prentice Hall.

2. Embedded Systems: Architecture, Programming & Design, Raj Kamal, 2008, Tata McGraw Hill

3. The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A. Mazidi, J.G. Mazidi, and R.D. McKinlay, 2nd Ed., 2007, Pearson Education India.

4. Microprocessor and Microcontrollers, N. Senthil Kumar, 2010, Oxford University Press

5. 8051 microcontrollers, Satish Shah, 2010, Oxford University Press.

6. Embedded Systems: Design & applications, S.F. Barrett, 2008, Pearson Education India

7. Introduction to embedded system, K.V. Shibu, 1st edition, 2009, McGraw Hill

8. Embedded Microcomputer systems: Real time interfacing, J.W. Valvano 2011, Cengage Learning

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ELECTRONICS LABORATORY

The scheme of practical examination will be as follows-

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

ELB 203P: COMMUNICATIONELECTRONICS LAB
(Hardware and Circuit Simulation Software) 60 Lectures
Max.Marks:25

1. To design an Amplitude Modulator using Transistor

2. To study envelope detector for demodulation of AM signal

3. To study FM - Generator and Detector circuit

4. To study AM Transmitter and Receiver

5. To study FM Transmitter and Receiver

6. To study Time Division Multiplexing (TDM)

7. To study Pulse Amplitude Modulation (PAM)

8. To study Pulse Width Modulation (PWM)

9. To study Pulse Position Modulation (PPM)

10. To study ASK, PSK and FSK modulators

Reference Books:

1. Electronic Communication systems, G. Kennedy, 1999, Tata McGraw Hill.
2. Electronic Communication system, Blake, Cengage, 5th edition.

ELB 204P: MICROPROCESSOR ANDMICROCONTROLLER
LAB(Hardware and Circuit Simulation Software)

Max.Marks:25

At least 06 experiments each from Section-A and Section-B

Section-A: Programs using 8085 Microprocessor

1. Addition and subtraction of numbers using direct addressing mode
2. Addition and subtraction of numbers using indirect addressing mode
3. Multiplication by repeated addition.
4. Division by repeated subtraction.
5. Handling of 16-bit Numbers.
6. Use of CALL and RETURN Instruction.
7. Block data handling.
8. Other programs (e.g. Parity Check, using interrupts, etc.).

Section-B: Experiments using 8051 microcontroller:

1. To find that the given numbers is prime or not.
2. To find the factorial of a number.
3. Write a program to make the two numbers equal by increasing the smallest number and decreasing the largest number.
4. Use one of the four ports of 8051 for O/P interfaced to eight LED's. Simulate binary counter (8 bit) on LED's .
5. Program to glow the first four LEDs then next four using TIMER application.
6. Program to rotate the contents of the accumulator first right and then left
7. Program to run a countdown from 9-0 in the seven segment LED display.
8. To interface seven segment LED display with 8051 microcontroller and display 'HELP' in the seven segment LED display.
9. To toggle '1234' as '1324' in the seven segment LED display.
10. Interface stepper motor with 8051 and write a program to move the motor through a given angle in clock wise or counter clockwise direction.
11. Application of embedded systems: Temperature measurement & display on LCD

Reference Books:

1. Microprocessor Architecture Programming & applications with 8085, 2002, R.S. Goankar, Prentice Hall.
2. Embedded Systems: Architecture, Programming & Design, Raj Kamal, 2008, Tata McGraw Hill
3. The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A. Mazidi, J.G. Mazidi, and R.D. McKinlay, 2nd Ed., 2007, Pearson Education India.
4. 8051 microcontrollers, Satish Shah, 2010, Oxford University Press.
5. Embedded Microcomputer systems: Real time interfacing, J.W. Valvano 2011, Cengage Learning

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 free wheeling 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 8operating 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, 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, processexecution, 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 andGerber Files; Drills; Footprints and Libraries Adding and Editing Pins, copper clad laminatesmaterials 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 ofLead 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

केन्द्रीय अध्ययन मंडल द्वारा अनुशंसित पाठ्यक्रम

बी.एससी.

विषय : भूविज्ञान

सत्र : 2018 – 2019

बैठक दिनांक : 11जून 2018

उपस्थित सदस्यों के नाम एवं हस्ताक्षर :

1. डॉ निनाद बोधनकर अध्यक्ष   :

2. डॉ. एम.डब्लू.वाय.खान   :

3. प्रो. एस.के. चन्द्राकर   :

4. प्रो. प्रदीप सिंह गौर   :

5. डॉ. एस.एस.भदौरिया   :

6. डॉ. एस.डी.देशमुख   :

7. डॉ. प्रशांत श्रीवास्तव   :

8. प्रो. महफूज आरिफ   :

Scheme of Examination

कक्षा	प्रश्नपत्र	विषय समूह	सैद्धा.अंक	प्रायो.अंक	योग
BSc. I year	I	भूगतिकी एवं भू–आकृति विज्ञान (Geodynamics & Geomorphology)	50	50	150
	II	खनिज एवं क्रिस्टल विज्ञान (Mineralogy & Crystallography)	50		
BSc. II year	I	शैलिकी (Petrology)	50	50	150
	II	संरचनात्मक भूविज्ञान (Structural Geology)	50		
BSc. III year	I	जीवाश्म विज्ञान एवं संस्तर विज्ञान (Palaeontology & Stratigraphy)	50	50	150
	II	भूसंसाधन एवं व्यावहारिक भूविज्ञान (Earth Resources & Applied Geology)	50		

-: Note :-

प्रत्येक वर्ष के विद्यार्थियों हेतु पाठ्यक्रम में उल्लेखित भूवैज्ञानिक क्षेत्रीय अध्ययन अनिवार्य होगा।

कक्षा / Class- B.Sc-I

Paper –I

भूगतिकी एवं भूआकृति विज्ञान

(Geodynamics & Geomorphology)

इकाई– 01   (i) भूविज्ञान एवं परिप्रेक्ष्य; सौरमण्डल में सूर्य की स्थिति ; परिमाण, आकार, संहति, घनत्व।

             (ii) पृथ्वी की उत्पत्ति

             (iii) पृथ्वी की आंतरिक संरचना, भूपर्पटी, प्रवार एवं क्रोड

             (iv) पृथ्वी की आयुः निर्धारण की विघटनाभिक विधियॉ

             (v) वायुमण्डल, जलमण्डल एवं जैवमण्डल का निर्माण एवं संगठन

इकाई– 02   (i) प्लेटविवर्तनिकी का प्रारंभिक– अध्ययन

             (ii) महाद्वीपीय विस्थापन की अवधारणायें एवं सिद्वान्त

             (iii) समस्थैतिकी की अवधारणायें एवं सिद्धान्त

             (iv) समुद्रतल विस्तारण की साक्ष्य

             (v) समुद्र, महाद्वीप एवं पर्वतों की उत्पत्ति

इकाई– 03   (i) भूकम्पः भूकम्प की पट्टिटयॉ, भूकम्प की तीव्रता

             (ii) ज्वालामुखीः प्रकार एवं विवरण

             (iii) अंतःसमुद्रीपर्वतों, चापाकार द्वीपमालाओं एवं खाइयों का उद्भव, विवरण एवं महत्व

             (iv) महाद्वीपीय तटीय क्षेत्रों की विवर्तनिकी : सक्रिय तट एवं सीमांतीय द्रोणियॉ

             (v) नवविवर्तनिकी : सक्रियभ्रंश, अपवाह परिवर्तन

इकाई– 04   (i) भूआकृति विज्ञान की मूलभूत धारणायें

             (ii) भूआकृतिक कारक एवं शैल अपक्षय की प्रक्रियायें,

             (iii) नदी के भूवैज्ञानिक कार्य एवं नदीय भूआकृतियॉ

             (iv) वायु के भूवैज्ञानिक कार्य एवं वायुजनित भूआकृतियॉ

             (v) हिमनदों के भूवैज्ञानिक कार्य एवं हिमनदजनित भूआकृतियॉ

इकाई– 05   (i) समुद्र के भूवैज्ञानिक कार्य एवं तटीय भूआकृतियॉं

(ii) भूमिगत जल के भूवैज्ञानिक कार्य एवं कार्स्टस्थलाकृति

(iii) ज्वालामुखीय भूआकृतियॉं

(iv) पृथ्वी का उष्माबजट एवं वैश्विक जलवायु परिवर्तन

(V) भारत का भूआकृति विभाजन

प्रायोगिक कार्य–

(1) भूआकृतिक संरचनाओं को प्रदर्शित करने वाले प्रादर्शो का अध्ययन

(2) स्थलाकृतिक मानचित्रों का अध्ययन एवं विभिन्न पैमानों पर सूचक–निर्धारण की जानकारियॉं

(3) भूआकृतिक–मानचित्रों में विभिन्न भूआकृतियों एवं प्रवाह प्रणालियों का अध्ययन

(4) भारत के रेखित–मानचित्र में मुख्य पर्वतों, झीलों एवं नदियों को अंकित करना

(5) भारत के रेखित मानचित्र में भूकम्प प्रेक्षणालयों को अंकित करना

(6) भारतीय महाद्वीपों में आये भूकम्पों का अधिकेन्द्र एवं तीव्रता को मानचित्र में अंकित करना।

(7) आकारिमितिक विश्लेषण

Unit:1   (i)   Geology & it perspectives. Earth in the solar system; size, shape, mass, & density.

(ii)   Origin of Earth.

(iii)   Internal structure of Earth, Crust, Mantle and Core.

(iv)   Age of Earth: with special emphasis on Radioactive dating.

(v)   Formation & composition of Hydrosphere, & Biosphere & Atmosphere.

Unit:2   (i)   Elementary idea about Plate-Tectonics.

(ii)   Concept & theories of continental-drift

(iii)   Concept & theories of lsostasy.

(iv)   Evidences of Sea-floor spreading.

(v)   Origin of oceans, continents & mountains.

Unit:3   (i)   Earthquakes, Earthquake Belts, measurement of Earthquakes.

(ii)   Volcanoes: Types & distribution.

(iii)   Mid –oceanic- ridges, trenches & island arc; origin, distribution & importance.

(iv)   Tectonic of continental margins; Active margins & marginal basins.

(v)   Neo-tectonics; active faults, drainage changes.

Unit:4   (i)   Fundamental concepts of Geomorphology.

(ii)   Geomorphic agents & processes of rock-weathering.

(iii)   Geological work of rivers; fluvial land forms.

(iv)   Geological work of wind; Aeolian land forms.

(v)   Geological work of Glaciers; glacial land forms.

Unit:5   (i)   Geological work of oceans; coastal land forms.

(ii)   Geological work of Ground water. Karst topography.

(iii)   Volcanic land forms.

(iv)   Earth's heat budget & global climatic changes.

(v)   Physiographic divisions of India.

PRACTICALS:

(1)   Study of models showing various Geomorphic features.

(2)   Numbering, Indexing of topographic maps on various scales.

(3)   Interpretation of various Geomorphic landforms & drainage pattern on topographic maps.

(4)   Plotting of major mountain Ranges, Lakes & rivers on outline map of India.

(5)   Plotting of seismic observatories on outline map of India.

(6)   Plotting of epicenters & magnitude of major earthquakes of Indian subcontinents.

(7)   Morphometric analysis.

Suggested Readings:-

भौतिक–भूविज्ञान   –   डॉ.मुकुल घोष–

भौतिक–भूविज्ञान   –   जे.पी. तिवारी एव ंबी.के. सिंह–

भूआकृति–विज्ञान   –   डॉ.सविन्द्र सिंह

भूविज्ञान एक परिचय   –   डॉ.विद्यासागर दुबे

Physical Geology   -   Miller

Principles of physical geology   -   A. Holmes

An introduction to physical geology- A.K. Dutta

Principles of Geomorphology   -   W.D. Thornbury

Principles of Geomorphology   -   A.F. Ahmed

कक्षा / Class- B.Sc-I

Paper –II

खनिज एवं क्रिस्टल विज्ञान

(Mineralogy & Crystallography)

इकाई– 01　(i)　खनिज एवं क्रिस्टल की परिभाषा।

(ii)　क्रिस्टल संरचना एवं एकांक कोष।

(iii)　क्रिस्टल के तत्व, क्रिस्टल रूप।

(iv)　क्रिस्टलीय अक्ष एवं अक्षीय कोण।

(v)　क्रिस्टल नोटेशन, अन्तःखण्डीय अनुपात एवं सूचकांक

इकाई– 02　(i)　क्रिस्टल विज्ञान के नियम।

(ii)　क्रिस्टलीय सममिति।

(iii)　क्रिस्टलों का वर्गीकरण। क्रिस्टल समुदायों के सामान्यवर्ग की सममिति।

(iv)　सामान्य वर्ग के रूप।

(v)　क्रिस्टलों में यमलन।

इकाई– 03　(i)　प्रकाश की प्रकृति, प्रकाश का परावर्तन एवं अपवर्तन।

(ii)　अपवर्तनांक, क्रांतिक कोण, पूर्ण आंतरिक परावर्तन एवं बेके प्रभाव।

(iii)　द्वि–अपवर्तन, निकॉल प्रिज्म की रचना एवं कार्य प्रणाली।

(iv)　ध्रुवण सूक्ष्मदर्शी : अवयव एवं कार्यप्रणाली।

(v)　खनिजों के प्रकाशीय गुण।

इकाई– 04　(i)　सिलिकेट संरचनाएं

(ii)　खनिजों में बंध।

(iii)　समाकृतिकता, बहुरूपता एवं कूटरूपता।

(iv)　ठोस–विलयन

(v)　खनिजों के भौतिक गुण।

इकाई– 05 निम्नलिखित खनिज समूहों के संगठन, भौतिक एवं प्रकाशकीय गुणों का अध्ययन–

      (i) ऑलिवीन्, गार्नेट एवं अभ्रक समूह।

      (ii) पायरॉक्सीन।

      (iii) एम्फीबोल।

      (iv) फेल्सपार।

      (v) सिलिका।

प्रायोगिक कार्य–

(1) क्रिस्टल मॉडल में सममिति तत्वों का अध्ययन।

(2) क्रिस्टल समुदायों की मूल आकृतियों का अध्ययन।

(3) यूलर प्रमेय का सत्यापन।

(4) प्रमुख शैलकर खनिजों का स्थूलदर्शी अध्ययन।

(5) ध्रुवण–सूक्ष्मदर्शी की सहायता से प्रमुख शैलकर खजिनों के प्रकाशीय गुणों का अध्ययन।

(6) सात दिवसीय भूवैज्ञानिक क्षेत्रीय अध्ययन

Unit:1   (i)   Definition of Mineral and Crystal.

(ii)   Crystal structures, Unit cells

(iii)   Elements of crystal. Crystal forms.

(iv)   Crystallographic axes and axial angles.

(v)   Parameters and indices of crystal notation

Unit:2   (i)   Laws of Crystallography

(ii)   Crystal symmetry

(iii)   Classification and symmetry of normal classes of seven crystal systems

(iv)   Forms of normal classes.

(v)   Twinning in crystals

Unit:3   (i)   Nature of light : reflection and refraction of light.

(ii)   Refractive index. Critical angles. Total internal reflection and Becke effect.

(iii)   Double refraction. Nicol prism it's construction and working.

(iv)   Polarizing Microscope- its parts & functions.

(v)   Optical properties of minerals.

Unit:4   (i)   Silicate structures.

(ii)   Bonding in Minerals.

(iii)   Isomorphism. Polymorphism and Pseudomorphism.

(iv)   Solid solution

(v)   Physical properties of minerals

Unit:5   Study of Composition, physical and optical properties of the following Mineral

groups:

(i)   Olivine, Garnet and Mica groups.

        (ii)   Pyroxenes

        (iii)   Amphiboles

        (iv)   Feldspars

        (v)   Silica

PRACTICALS-

(1)   Study of symmetry elements in crystal models.

(2)   Study of Fundamental forms of normal classes of all seven crystal system.

(3)   Verification of Euler's theorem.

(4)   Study of Physical properties of rock forming minerals.

(5)   Study of the optical properties of important rock forming minerals using polarizing Microscopes.

(6)   Geological excursion for seven days.

Suggested Readings:

Rutley's elements of Mineralogy   :   Read, H.D.

Dana's text book of Mineralogy   :   Ford W.E.

खनिज तथा क्रिस्टल विज्ञान   –   डॉ.बी.सी. जैश

खनिज विज्ञान के सिद्धांत   –   डॉ. ए.सी. अग्रवाल

प्रायोगिक भू–विज्ञान (भाग–1)   –   डॉ. र. प्र. मांजरेकर

प्रकाशीय खनिज विज्ञान के मूल तत्व   –   विंचेल

कक्षा / Class- B.Sc-II

Paper –I

शैलिकी

(PETROLOGY)

इकाई–01   (i)   मैग्मा; परिभाषा, उत्पत्ति एवं संगठन

(ii)   बोवेन की अभिक्रिया श्रेणी, मैग्मीय विभेदन एवं स्वांगीकरण

(iii)   तंत्र, प्रावस्था एवं घटक, उष्मागतिकी के सिद्धांत, एकघटकीय (सिलिका) द्विघटकीय ऐल्बाईट–एनार्थाइट तथा डायोप्साइड–एनार्थाइट एवं त्रिघटकीय सिलिकेट सिस्टम डायोप्साइड–एल्बाइट–एनार्थाइट क्रिस्टलीकरण, प्रावस्था संतुलन

(iv)   आग्नेय शैलों का गठन, संरचनायें एवं वर्गीकरण

(v)   आग्नेय शैलों का रूप

इकाई–02   (i)   दिक्काल में शैल–संलग्नता, शैल–ग्रंथियों की अवधारणा

(ii)   अम्लीय आग्नेय शैलों का शिला विवरणात्मक अध्ययन

(iii)   क्षारीय आग्नेय शैलों का शिला–विवरणात्मक अध्ययन

(iv)   अल्पसिलिक आग्नेय शैलों का शिलाविवरणात्मक अध्ययन

(v)   अत्यल्पसिलिक आग्नेय शैलों का शिलाविवरणात्मक अध्ययन

इकाई–03   (i)   अवसाद की उत्पत्ति, परिवहन एवं निक्षेपण

(ii)   अवसाद निक्षेपण की वायूढ़, जलोढ़, तटीय, एवं गंभीर समुद्री वातावरण की गतिकी

(iii)   अवसादी संलक्षणाओं की अवधारणा

(iv)   डायजिनेसिस की अवधारणा

(v)   अवसादी शैलों का गठन एवं संरचनायें

इकाई–04   (i)   अवसादी शैलों का वर्गीकरण

(ii)   अवसादी शैलों की शैलिकी : रूडेशियस, एरेनिशियस, केल्केरियस अवसादी शैल

(iii)   कायान्तरणः परिभाषा एवं कारक, संलक्षणा, कायान्तरण श्रेणी

(iv) कायान्तरित शैलों का गठन, संरचना एवं वर्गीकरण

(v) कायान्तरण प्रक्रियाओं की साम्य एवं असाम्य अभिक्रियायें

इकाई–05 (i) पैराजिनेटिक–ओरखः प्रक्षपीय विश्लेषण, ए.सी.एफ. एवं ए.के.एफ. आरेख

(ii) मृण्मय अवसादों का प्रगामी कायान्तरण

(iii) अशुद्ध चूना पत्थरों का प्रगामी–उष्मागतिक कायान्तरण

(iv) अल्प सिलिक शैलों का प्रगामी उष्मागतिक कायान्तरण

(v) भारत का शैलिकीय–प्रादेशिक विभाजन

प्रायोगिक कार्य–

(1) आग्नेय, अवसादी एवं कायान्तरित शैलों के विभिन्न रूपों को रेखाचित्र की सहायता से प्रदर्शित करना।

(2) विभिन्न आग्नेय शैलों का स्थूलदर्शी / सूक्ष्मदर्शी अध्ययन

(3) विभिन्न अवसादी शैलों का स्थूलदर्शी / सूक्ष्मदर्शी अध्ययन

(4) विभिन्न कायान्तरित शैलों का स्थूलदर्शी / सूक्ष्मदर्शी अध्ययन

(5) भारत के शैलिकीय प्रदेशों का मानचित्र में प्रदर्शन

Suggested Readings:-

(1) शैलिकी के सिद्धान्त   –   डॉ.अंबिका प्रसाद अग्रवाल

(2) शैलिकी के सिद्धान्त   –   ए.जी. झिंगरन

(3) Principles of petrology   -   G.W. Gyrrel

(4) Petrology   -   H.William, F.J. Turner & E.M. Gilbert

(5) Petrology of igneous & metamorphic rocks of India- S.C. Chattarjee

(6) A text book of sedimentary petrology   -   Verma & Prasad

(7) Metamorphism & Metamorphic rocks of India- S.Ray

(8) Sedimentary rocks   -   F.J. Pettijhan

(9) Introduction of sedimentology -   S.Sengupta

(10) Sedimentary environment   -   H.G. Readings

Unit:1
(i) Magma, definition, origin & composition

(ii) Bowen's reaction series, magmatic differentiation & assimilation

(iii) System, phases & component, principles of thermodynamics,

Bi-component magma: Albite-Anorthite and Diposide-Anorthite

Tri-component magma: Diopside-Albite-Anorthite

(iv) Texture, structures & classification of igneous rocks

(v) Forms of igneous rocks

Unit:2
(i) Rock association in Time & Space, concepts of rock kindreds

(ii) Petrographic studies of Acid igneous rocks.

(iii) Petrographic studies of Alkaline igneous rocks

(iv) Petrographic studies of Basic igneous rock

(v) Petrographic studies of Ultrabasic igneous rocks.

Unit:3
(i) Origin, transportation & deposition of sediments

(ii) Dynamics of sedimentary depositional environment ; Aeolian, fluvial, coastal

and abyssal environment.

(iii) Concepts of sedimentary facies

(iv) Concepts of diagenesis

(v) Textures & structures of sedimentary rocks.

Unit:4
(i) Classification of sedimentary rocks.

(ii) Petrography of sedimentary rock; rudaceous, aranaceous, calcareous

sedimentary rocks

(iii) Metamorphism; definition, agents, facies & grade

(iv) Textures, structures & classification of metamorphic rocks.

(v) Equilibrium & non-equilibrium reactions in metamorphism.

Unit:5   (i)   Paragenetic diagrams; projective analysis A.C.F & A.K.F. diagrams

                (ii)   Progressive metamorphism of Argillaceous rocks.

                (iii)   Progressive dynamo-thermal metamorphism of impure lime-stone.

                (iv)   Progressive dynamo-thermal metamorphism of basic igneous rocks.

                (v)   Petrographic provinces of India.

Practical:

(1)   Diagrammatic representation of various form & structures of igneous, sedimentary & Metamorphic rocks

(2)   Megascopic studies of various sedimentary, metamorphic & igneous rocks.

(3)   Microscopic studies of various sedimentary, metamorphic & igneous rocks.

(4)   Norm calculation

(5)   Diagrammatic representation of petrography provinces of India in outline map of India.

<u>Suggested Readings:-</u>

(1)   शैलिकी के सिद्धान्त   – डॉ.अंबिका प्रसाद अग्रवाल

(2)   शैलिकी के सिद्धान्त   – ए.जी. झिंगरन

(3)   Principles of petrology   -   G.W. Tyrell

(4)   Petrology   -   H.William, F.J. Turner & E.M. Gilbert

(5)   Petrology of igneous & metamorphic rocks of India- S.C. Chattarjee

(6)   A text book of sedimentary petrology   -   Verma & Prasad

(7)   Metamorphism & Metamorphic rocks of India- S.Ray

(8)   Sedimentary rocks   -   F.J. Pettijohn

(9)   Introduction of sedimentology   -   S.Sengupta

(10)   Sedimentary environment   -   H.G. Readings

कक्षा / Class- B.Sc-II

Paper –II

संरचनात्मक भू–विज्ञान

(STRUCTURAL GEOLOGY)

इकाई–01 (1) संरचनात्मक भूविज्ञान की परिभाषा एवं अध्ययन क्षेत्र।

(2) शैल दृश्यांशों का अध्ययन। दृश्यांशों पर नति तथा ढाल के प्रभाव।

(3) संस्तरण की पहचान। नति एवं नतिलम्ब की माप।

(4) क्लाइनोमीटर एवं ब्रन्टन कम्पास।

(5) संस्तरों के शीर्ष तथा तल की पहचान।

(6) शैलविरूपण की अवधारणा। प्रतिबल तथा विकृति दीर्घवृत्तज की अवधारणा।

इकाई–02 (1) वलन की आकारिकी।

(2) वलन की ज्यामितिक एवं जननिक वर्गीकरण।

(3) स्थलीय तथा भूवैज्ञानिक मानचित्र में वलन की पहचान।

(4) दृश्यांशों पर वलन के प्रभाव।

(5) वलन क्रियाविधि की प्राथमिक अवधारणा।

इकाई–03 (1) भ्रंश आकारिकी। सर्पण और सेपरेशन।

(2) भ्रंश का ज्यामितिक एवं जननिक वर्गीकरण।

(3) स्थलक्षेत्र तथा भूवैज्ञानिक मानचित्र में भ्रंश की पहचान।

(4) दृश्यांशों पर भ्रंश के प्रभाव।

(5) भ्रंशन क्रियाविधि की प्राथमिक अवधारणा।

इकाई–04 (1) संधि; आकारिकी, संधि का ज्यामितिक एवं जननिक वर्गीकरण।

(2) पत्रण की परिभाषिक शब्दावली, प्रकार, उत्पत्ति एवं विशाल संरचनाओं से संबंध।

(3) रेखण की परिभाषिक शब्दावली, प्रकार, उत्पत्ति एवं विशाल संरचनाओं से संबंध।

(4) लवण गुम्बद,

(5) प्लूटान; विवर्तनिकी एवं अभिस्थापन

इकाई—05 (1) विषमविन्यास के प्रकार एवं पहचान।

(2) आउटलायर तथा इनलायर, अतिव्यापन तथा अपव्यापन।

(3) विवर्तनिकी की अवधारणा।

(4) प्रायद्वीपीय, सिंधु गंगा के मैदान तथा प्रायद्वीपेत्तर भारत का विवर्तनिकी विन्यास।

(5) त्रिविमीय प्रक्षेपण का भूविज्ञान में अनुप्रयोग।

प्रायोगिक कार्य—

(1) प्राकृतिक संरचनात्मक प्रादर्शो का अध्ययन।

(2) विभिन्न संरचनाओं का प्रादर्शो के माध्यम से अध्ययन।

(3) मानचित्र में दृश्यांश को पूरा करना।

(4) सरल से जटिल संरचनाओं को प्रदर्शित करने वाले मानचित्रों से भूवैज्ञानिक काट बनाना एवं भूवैज्ञानिक इतिहास की विवेचना करना।

(5) संरचनाओं के अध्ययन में स्टिरियोग्राफिक प्रोजेक्शन का अनुप्रयोग।

(6) सात दिवसीय भूवैज्ञानिक क्षेत्रीय अध्ययन

Unit:1 (i) Definition and scope of Structural Geology. Study of outcrops. Effects of dip and slope on outcrops.

(ii) Identification of bedding. Dip and strike measurement.

(iii) Clinometer and Brunton compass.

(iv) Recognition of top and bottom of beds.

(v) Concept of rock deformation. Concept of stress and strain ellipsoids.

Unit:2 (i) Fold morphology.

(ii) Geometric and genetic classification of folds.

(iii) Recognition of folds in the field and on geological maps.

(iv) Effect of folds on outcrops.

(v) Elementary idea of mechanics of folding.

Unit:3 (i) Fault morphology. Slip and separation.

(ii) Geometric and genetic classification of faults.

(iii) Recognition of faults in the field and on geological maps.

(iv) Effect of faults on outcrops.

(vi) Elementary idea of mechanics of faulting.

Unit:4 (i) Joint morphology; geometric and genetic classification of joints.

(ii) Foliation; terminology, kinds, origin and relation to major structures.

(iii) Lineation: terminology, Kind, origin and relation to major structures.

(iv) Salt domes.

(vii) Plutons; tectonics & emplacement.

Unit:5 (i) Types and recognition of Unconformity.

(ii) Outlier and inlier. Overlap & offlap.

(iii)   Concept of tectonics.

(iv)   Tectonic framework of Peninsula, Indo-Gangetic Plains and Extra-Peninsular India.

(v)   Stereographic projection & it use in Structural geology.

Practical-

(1)   Study of Natural Structures on specimens.

(2)   Study of structures with the help of models.

(3)   Completion of outcrops.

(4)   Preparation of geological section from simple to complex geological maps and its interpretation.

(5)   Application of stereographic projection in structural geology.

(6)   Geological excursion for seven days.

Books recommended:

(1)   संरचनात्क भूविज्ञान   – डॉ.डी.के. श्रीवास्तव

(2)   भूवैज्ञानिक संरचनाऍ   – डॉ. भरत सिंह राठौर

(3)   प्रायोगिक भूविज्ञान (भाग–2) – आर.पी. मांजरेकर

(4)   Structural Geology.   M.P. Billings.

(5)   Theory of Structural Geology; Gokhale, N.W. CBS

(6)   Exercises on Geological maps and dip-Strike: Gokhale, N.W. CBS.

(7)   Outlines of structural Geology. E.S. Hills.

(8)   Structural Geology- Hobbs. Means and Williams.

(9)   Geological maps- Chiplonkar and Pawar.

Paper –I

जीवाश्म विज्ञान एवं संस्तर विज्ञान

(Palaeontology & Stratigraphy)

इकाई–01 (1) जीवाश्म विज्ञानः जीवाश्म, परिभाषा, जीवाश्मन की आवश्यक परिस्थितियॉ एवं विधियॉ

(2) जीवश्मों के उपयोग, सूचक–जीवाश्म एवं उनका महत्व

(3) संस्तर विज्ञान, पुरापारिस्थितिकी एवं पुराभूगोल के अध्ययन में जीवाश्म विज्ञान का महत्व।

(4) सूक्ष्मजीवाश्मविज्ञान एवं उसका महत्व।

(5) पादप जीवाश्मों का अध्ययन एवं उनका महत्व।

इकाई–02 (1) फोरामिनिफेरा एवं एंथोजोआ जीवाश्मों की आकारिकी एवं भूवैज्ञानिक वितरण।

(2) गेस्ट्रोपोडा एवं लेमिलिब्रेन्किया जीवाश्मों की आकारिकी एवं भूवैज्ञानिक वितरण।

(3) सिफेलोपोड़ा जीवाश्मों की आकारिकी एवं भूवैज्ञानिक वितरण।

(4) इकिनायडी एवं ब्रेकियोपोडा जीवाश्मों की आकारिकी एवं भूवैज्ञानिक वितरण।

(5) ट्राइलोबाइट एवं ग्रेप्टोलाइट जीवाश्मों की आकारिकी एवं भूवैज्ञानिक वितरण।

इकाई–03 (1) संस्तर विज्ञान के सिद्धान्त, भूवैज्ञानिक समय सारणी।

(2) अश्मसंस्तरिक, कालानुक्रम संस्तरिक एवं जैव संस्तरिक इकाईयों के विषय में मूलभूत धारणायें।

(3) भारतीय उपमहाद्वीप का संरचनात्मक एवं भौतिकीय उपविभाजन एवं उसकी विशिष्टतायें।

(4) भारत वर्ष के आद्यमहाकल्पीय (धारवार) शैलों का वितरण, वर्गीकरण, एवं आर्थिक महत्व।

(5) छत्तीसगढ़ के बस्तर, रावघाट, संघों का वितरण, संस्तर विज्ञान एवं आर्थिक महत्व।

इकाई–04	(1)	विन्ध्य एवं छत्तीसगढ़ महासंघ के शैलों के वितरण, संसतर विज्ञान एवं आर्थिक महत्व।
	(2)	गोंडवाना महासंघ का संसतर विज्ञान, पुराजलवायु, भौगोलिक वितरण एवं आर्थिक महत्व।
	(3)	डेक्कन ट्रेप का संसतर विज्ञान, भौगोलिक वितरण एवं आयु।
	(4)	बाघ संसतर एवं लेमेटा संसतर का संसतर विज्ञान, भौगोलिक वितरण एवं जीवाश्म।
	(5)	साल्ट रेंज क्षेत्रों के पुराजीव समूहों का भौगोलिक वितरण संसतर विज्ञान एवं जीवाश्मिकी।
इकाई–05	(1)	स्पिटी क्षेत्रों के पुराजीव समूहों का भौगोलिक वितरण, संसतर विज्ञान एवं आर्थिक महत्व।
	(2)	त्रिचनापल्ली क्षेत्र के क्रिटेशियस शैलों का संसतर विज्ञान, जीवाश्म एवं आर्थिकी।
	(3)	कच्छ क्षेत्र के जुरासिक शैलों का संसतर विज्ञान, जीवाश्म एवं आर्थिकी।
	(4)	असम के तृतीयक महायुग समूह का भौगोलिक वितरण संसतर विज्ञान एवं आर्थिकी।
	(5)	शिवालिक समूह का संसतर विज्ञान, भौगोलिक वितरण एवं कशेरूकीय जीवाश्मीय तत्व।

प्रायोगिक कार्यः

(1) सैद्धांतिक पाठ्यक्रम के अन्तर्गत उल्लेखित जीवाश्मों की आकारिकी का अध्ययन।

(2) प्रमुख पादप जीवाश्मों का अध्ययन।

(3) भारत के रेखा मानचित्र में विभिन्न संसतर विज्ञानी इकाईयों को दर्शाना।

(4) भारत के प्रमुख भूआकृतिक एवं शैल विवर्तनिक इकाईयों को रेखा मानचित्र में प्रदर्शित करना।

Suggested Readings

(1) जीवाश्म विज्ञान के सिद्धांत– डॉ.अंबिका प्रसाद अग्रवाल

(2) जीवाश्म विज्ञान– डॉ. आर.पी. मिश्रा

(3) अकशेरूकी एवं कशेरूकीय जीवाश्म विज्ञान– डॉ. दीपक राज तिवारी

(4) भारत वर्ष का भूविज्ञान– डॉ.अंबिका प्रसाद अग्रवाल

(5) प्रायोगिक भू विज्ञान भाग—3— डॉ. गुप्ता, पुनवटकर, रघुवंशी

(6) Invertebrate Palaeontology- H.Woods.

(7) Introduction to Palaentology- A.N. Davis.

(8) An Introduction to Invertebrate Palaeontology- P.G. Jain & M.S. Anantha Raman

(9) Historical Geology of India- Ravidra Kumar

(10) Geology of India- R.Vidhyanathan & M.Ramkrishne (GSI Publication)

(11) Geology of India & Burma- M.S. Krishnan.

Unit-1   (1)   Palaeontology: Fossils- definition, Essentials for fossilization mode of fossilization.

          (2)   Uses of fossils; Index fossils & their significance.

          (3)   Application of palaeontology in the study of stratigraphy. Palaeoecology And Palaeo-geography.

          (4)   Micro palaeontology & their significance.

          (5)   Study of plant fossils & their significance.

Unit-2   (1)   Morphology & Geologic distribution of foraminifera & Anthozoa fossils.

          (2)   Morphology & Geological distribution of Gastropoda and lamellibranchia fossils.

          (3)   Morphology & Geological distribution or Cephalopoda.

          (4)   Morphology & Geological distribution or Echinoidae & Brachiopoda fossils.

          (5)   Morphology & Geological distribution of Triobite 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 & Palaeontology of salt Range group of rocks.

Unit-5   (1) Distribution, Stratigraphy & Economics of Palaeozoic rocks of Spiti 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 & Palaeontological importance of Siwalik group of rocks.

Practicals:-

(1) Study of Morphology of Fossils belonging to various phyla.

(2) Study of Important plant fossils.

(3) Representation of Litho-units & Stratigraphic Units in out line map of India.

(4) Sketching of physiographic and tectonic divisions of India.

(5) Geological excursion for seven days.

Paper –II

भूसंसाधन एवं व्यावहारिक भूविज्ञान

(Earth Resources & Applied Geology)

इकाई–01　　(1)　आर्थिक भूविज्ञान परिचय एवं परिप्रेक्ष्य : वैश्विक खनिज निचय एवं संसाधन, दिक्काल में खनिज निक्षेपों का वितरण।

(2)　खनिज निक्षेपों का वर्गीकरण। भूवैज्ञानिक तापमापी।

(3)　अयस्क निर्माण की मैग्मीय सांद्रण विधि। उष्णजलीय प्रक्रियायें।

(4)　अपक्षय उत्पाद एवं अवशिष्ट निक्षेप। आक्सीकरण एवं सल्फाइड समृद्धि प्रक्रम।

(5)　अयस्क निर्माण की अवसादी प्रक्रिया। बलकृत सांद्रण।

इकाई–02　भारत के संदर्भ में निम्नलिखित धात्विक／अधात्विक खनिज निक्षेपों की प्राप्ति अवस्था, खनिजकीय विशेषता, भूवैज्ञानिक एवं भौगोलिक वितरण एवं आर्थिक उपयोगों का वितरण।

(1)　लौह, मैगनीज, क्रोमियम।

(2)　ताम्र, सीसा, जस्ता।

(3)　सोना, अल्युमिनियम।

(4)　तापसह एवं उर्वरकखनिज।

(5)　सीमेंट एवं केमिकल उद्योग में प्रयुक्त खनिज।

इकाई–03　　(1)　कोयला निक्षेपों की उत्पत्ति, परिभाषा एवं संस्तर विज्ञान।

(2)　कोल शैलिकी के मूलभूततथ्य। पीट, लिग्नाईट, बिटूमिनस, एंथ्रासाइट कोल, भारतीय कोल निक्षेपः विशेष संदर्भ में छत्तीसगढ़।

(3)　प्राकृतिक हाइड्रोकार्बन की उत्पत्ति, स्थानांतरण एवं संचयन। आयल ट्रेप के प्रकारः संरचनात्मक, संस्तर विज्ञानी एवं मिश्रित। भारत के तटीय एवं अपतटीय पेट्रोलियम निक्षेप।

(4)　रेडियोधर्मी खनिजः खनिजविज्ञान, भूरसायन, पूर्वेक्षण तकनिकी, भारत में भौगोलिक एवं भूवैज्ञानिक वितरण।

(5) खनिज आर्थिकी के सिद्धान्त, राष्ट्रीय खनिजनीति।

इकाई–04 (1) भूअभियांत्रिकी विज्ञान एवं उसका महत्व। शैलों के अभियांत्रिकी गुण।

(2) वृहद् बांध एवं सुरंग निर्माण के लिये भूवैज्ञानिक परिस्थितियों का अध्ययन।

(3) हवाई छायाचित्रों एवं उपग्रह इमेजियरी का प्रारंभिक अध्ययन। शहरी विकास में सुदूर संवेदन तकनीकी का अनुप्रयोग।

(4) जलचक्र। भूमिगत जल की प्राप्ति अवस्था। भूजल की गुणवत्ता।

(5) शैलों के भूजलीय गुण। जलभृत संस्तरों का वर्गीकरण। भारत का भूजल प्रदेश।

इकाई–05 (1) खनिज अंवेषण का परिचय। खनिज अन्वेषण की सतही एवं अधोसतही विधियाँ।

(2) आर्थिक खनिजों के लिये पूर्वेक्षण विधियाँ: ड्रीलिंग, प्रतिचयन एवं आमापन।

(3) भूभौतिकीय पूर्वेक्षणतकनीक: गुरूत्वीय, विद्युतीय एवं चुम्बकीय विधियाँ।

(4) हवाई पूर्वेक्षण विधि एवं भूकम्पीय विधियाँ।

(5) खनिज स्त्रोंतों के अत्याधिक दोहन के पर्यावरणीय प्रभाव।

प्रयोगिक कार्यः

(1) सैद्धान्तिक पाठ्यक्रम में दिये प्रमुख धात्विक/अधात्विक खनिजों का भौतिक/प्रकाशीय गुणों के आधार पर अध्ययन।

(2) भारत के रेखा मानचित्र में प्रमुख धात्विक/अधात्विक खनिजों का वितरण दर्शाना।

(3) कोयला एवं उसके विभिन्न प्रकारों के नमूनों का स्थूलदर्शी अध्ययन।

(4) खनिज निष्कर्षण से संबंधित प्रायोगिक अभ्यास कार्यः निक्षेप आकलन, टनेज फेक्टर आकलन, ड्रीलिंग आदि से अभ्यास।

(5) स्टिरियोस्कोप के द्वारा ऐरियल छायाचित्र का अध्ययन एवं विवेचना।

(6) उपग्रह इमेजियरी का अध्ययन एवं विवेचना।

(7) शैलों के भौमजलीय गुणों का अध्ययन, भौमजलीय मानचित्रों का बनाना एवं अध्ययन

(8) दस दिवसीय भूवैज्ञानिक क्षेत्रीय अध्ययन

Suggested Readings:

(1) आर्थिक भूविज्ञान– कृष्ण गोपाल व्यास

(2) आर्थिक एवं व्यावहारिक भूविज्ञान– आर.पी. मांजरेकर

(3) भौमजल विज्ञान– एल.के. रिछारिया

(4) प्रारंभिक खनिकी– बी.के. सिंह

(5) प्रायोगिक भूविज्ञान भाग–3– गुप्ता, पुनवटकर एवं रघुवंशी

(6) Economic mineral deposits of India- Umeshwar Prasad.

(7) Economic mineral deposits- A.Bateman

(8) Ore-deposit of India- Gokhale & Rao

(9) India's Mineral Resource- S. Krishnaswami

(10) Principle of Engineering Geology & Geotechniques- Krynine & Judd.

(11) Groundwater Hydrology- D.K. Todd

(12) Courses in mining Geology- R.N.P. Arogyaswami

(13) Principle & Application of photogeology- S.N. Pandey.

(14) Ground water- Assessment, Development & Management- K.R. Karanth

(15) Geophysical methods in Geology- P.V. Sharma.

(16) Environmental Geology- K.S. Valdiya (1987)

Paper –II

(Earth Resources & Applied Geology)

Unit-1 (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.

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

Unit-2 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-3 (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, stratigraphic 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-4 (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-5   (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.

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Scheme &Syllabus

Subject: Microbiology

Approved at Central Board of Studies meeting held at

School of studies in Life science at Pt. Ravishankar Shukla University Raipur

on august 21,2018

MICROBIOLOGY

BSc-1st

Paper- I: General Microbiology & Basic Technique

UNIT-1: Fundamental, History & Developments

Introduction to major groups of microorganisms and fields of Microbiology; Historical development, Contributions of Pioneers (Louis Pasteur, Edward Jenner, Anton Von Leewenhoeck and Alexander Flemming). Beneficial and harmful microbes and its role in daily life.

UNIT-2: Basic Microbial Techniques

Methods of studying microorganism; Sterilization Techniques (Physical & Chemical Sterilization). Pure culture isolation Technique: Streaking,Waksman serial dilution and plating methods. cultivation, maintenance and preservation of pure cultures. Culture media & conditions for microbial growth. Staining technique: simple staining, Differential (gram staining), negative staining and acid fast staining.

UNIT-3: Virology & Bacteriology

Diversity of microbial world; Principle and classification of Viruses and Bacteria. Structure, Multiplication and Economic importance of viruses (TMV, Influenza virus & T_4-Phage). Structure & Functional organization of Bacteria, Cell wall of Gram Positive & **G**ram Negative bacteria; Economic importance of Bacteria.

UNIT-4: Mycology

General characteristics and classification of Fungi; Structure and Reproduction of fungi (*Rhizopus, Penicillium, Aspergillus, Yeast & Agaricus*). Common fungal disease of crops (Late & Early blight of potato, Smut of Rice, Tikka and Red rot of Sugarcane). Structure, reproduction and economic aspect of Lichens.

UNIT-5: Phycology & Protozoology

General characteristics and classification of Algae and Protozoa; General account & economic importance of Cyanobacteria (*Microcystis, Ocillitoria, Nostoc & Anabaena)* and Protozoa *(Amoeba, Paramoecium, Euglena and plasmodium).*

Text Books Recommended:

1. General microbiology; Vol I & II, Powar C. B. and Daginawala H. I., Himalaypub.house, Bombay.
2. A textbook of Microbiology; Dubey &Maheshwari.
3. Microbiology: An Introduction; G. Tor tora, B. Funke, C. Benjamin Cummings.
4. General Microbiology; Seventh edition by Hans G Schlegel, CambridgeUniversity Press.
5. Practical Microbiology; Dubey and Maheshwari.
6. Handbook of Microbiology; Bisen P.S., Varma K., CBS Publishers and Distributors, Delhi. General Microbiology by Brock.
7. General Microbiology by Pelzar et al.
8. Introduction on Microbial Techniques by Gunasekaran.

Paper- II: Biochemistry and Physiology

UNIT-1: CARBOHYDRATES AND PROTEINS

Structure, classification and properties of Carbohydrates – Monosaccharide, Oligosaccharides (Disaccharides) and Polysaccharides. Structure, classification and properties of Protein - Amino acids, peptides and Proteins (Primary, Secondary, Tertiary and Quaternary structure).

UNIT-2: LIPIDS AND NUCLEIC ACIDS

Structure, classification and properties of Lipids; Saturated and Unsaturated fatty acids. Structure and properties of Nucleotides. Structure and forms of DNA; Replication of DNA. Types, Structure and Function of RNA.

UNIT-3: ENZYMES

Structure, Nomenclature, Classification and Properties of Enzymes. Mechanism of enzyme action, Enzyme kinetic: Michaelis-Menten. Equation & derivation, Enzyme inhibition, Lineweaver-Burk Plot (LB plot). Co-enzymes and their role; Allosteric enzymes and Isoenzyme. Extracellular enzymes and their role.

UNIT-4: MICROBIAL METABOLISM

Bacterial photosynthesis and Chemosynthesis: Glycolysis, TCA cycle and Oxidative Phosphorylation. Anaerobic catabolism of glucose; Fat Biosynthesis,alpha and beta oxidation of fatty acids. Deamination, trasns-amination and Urea cycle.

UNIT-5: GROWTH PHYSIOLOGY & TRANSPORT SYSTEM

Bacterial cell division, Genome replication and Growth Phases, Conditions for growth. Plasma membrane & Transport system, types of transport (Passive and active). Diffusion (simple & facilitated), Concept of Uniport, Antiport and Symport;

Text Books Recommended:

1. General Biochemistry by A.C. Deb.
2. Biochemistry by Lehninger (Kalyani publication)
3. Biochemistry by U. Satyanarayan.
4. Microbiology by Anantanarayan and Panikar.
5. Fundamentals of Biochemistry; J L Jain, Sunjay Jain, Nitin Jain; S. Chand & Company Ltd
6. Practical Biochemistry: Principles and Techniques; *5th Edition*; Keith Wilson and John Walker
7. Biophysical Biochemistry: Principles and Techniques; AvinashUpadhyay, KakoliUpadhyay and Nirmalendu Nath; Himalaya Publishing House.

PRACTICAL

M. M. 50
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Basic information about autoclave, hot air oven, laminar air flow and other laboratory instruments
     Preparation of solid/liquid culture media.
     Isolation of single colonies on solid media.
     Enumeration of bacterial numbers by serial dilution and plating.
     Simple and differential staining.
     Measurement of microorganism (micrometry) and camera Lucida drawing of isolated organism.
     Determination of bacterial growth by optical density measurement.
     General and specific qualitative test for carbohydrates
     General and specific qualitative test for amino acids
     General and specific qualitative test for lipids
     Estimation of protein
     Estimation of blood glucose
     Assay of the activity of amylases
     Assay of the activity of Phosphates

Scheme of Practical Examination

Time - 4 hours   M.M. 50

    1. Exercise on Microbiological methods   10
    2. Exercise on Biochemical tests   10
    3. Exercise on staining method   05
    4. Spotting (1-5)   10
    5. Viva-Voce   05
    6. Sessional   10

                                            Total 50

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MICROBIOLOGY
BSc-2ⁿᵈ

Paper- I: Molecular Biology and Genetic Engineering

UNIT-1: FUNDAMENTALS OF MOLECULAR BIOLOGY

History and scope of molecular biology, concept and mechanism of heredity. DNA as genetic material- experimental evidences. DNA replication- mechanism, process and enzymes/proteins involved in replication.

UNIT-2: CENTRAL DOGMA OF PROTEIN SYNTHESIS

Transcription- initiation, elongation, termination, RNA polymerases and sigma factor. Transcription inhibitors (antibiotics, drugs). Translation- initiation, elongation and termination. Factors involved in translation. Genetic code.

UNIT-3: MUTATION AND DNA REPAIR MECHANISM

Introduction and Types of Gene mutations- Base substitution, frame shift mutation (insertion, deletion, miss-sense, nonsense mutation.) mutagens – physical and chemical. Reverse mutation in bacteria. DNA repair mechanism (mismatch repair, photo-reactivation, excision and SOS repair). Beneficial and harmful effect of mutation.

UNIT-4: GENE REGULATION

Concept of gene- Cistron, Recon, Muton. Operon Concept- lac Operon, tryptophan Operon, His Operon. Activator, Co-activator and Repressor. Introduction to Bioinformatics- Elementary genome Database.

UNIT-5: GENETIC ENGINEERING

Basic concept of Genetic Engineering, DNA modifying enzymes Restriction endonuclease, DNA ligase, terminal transferase. Vectors-pBR322, pUC19, BAC and YAC. Phage based vectors, expression of vector. Transformation – physical and chemical method. Bacterial Host. Screening of recombinant vector Blue white Screening, Colony Hybridization.

Text Books Recommended:

1. Gene Cloning by T.A. Brown.
2. General Microbiology by Power and Daganiwala.
3. Zinssers Microbiology by KJ Wolfgang, McGraw- HJill Company.
4. Microbial Genetics by RM Stanley, F David and EC John.
5. Bacteriological Techniques by FJ Baker.
6. .Molecular Biology of the Cell; *3rd Edition;* Bruce Alberts ,et.al; Garland Publishing.
7. Cell biology; C.B. Powar; Himalaya Publishing House; Fifth edition
8. Cell & Molecular Biology; Gerald Karp; Fourth edition
9. A Textbook of Microbiology; Dubey&Maheshwari; S.chand& Sons.
10. Cell biology & Genetics; P. K. Gupta
11. Introduction to Bioinformatics; T K Atwood and D J Parry-Smith; Pearson Education Ltd

Paper- II: Bioinstrumentation and Biostatistics

UNIT-1: MICROSCOPY AND CENTRIFUGATION

Simple and compound light microscope, Bright field, Dark field, Phase contrast and Electron microscope. Centrifugation- principle and types of centrifuges (analytical and preparatory), types of centrifugation- differential and rate zonal centrifugation.

UNIT-2: pH metry and chromatography

Principle of pH meter, types of electrodes, factors affecting pH measurements, and application of pH meter. Chromatography- principle, types- paper, TLC and column chromatography, HPLC.

UNIT-3: SPECTROPHOTOMETRY

Electromagnetic spectrum, Beers-Lamberts law, Types (Principles, working and application)- colorimeter, UV - Vis Spectrophotometry and IR- Spectrophotometry, Turbidometry.

UNIT-4: Electrophoresis and X-Ray Diffraction

Principle of electrophoresis, instrumentation and Application, types of Paper, Gel electrophoresis and Immunoelectrophoresis. X-ray diffraction- principle and application.

UNIT-5: Biostatistics

Data- Types, characteristics, presentation and distribution. Data analysis- central tendency (Mean, Median and Mode), Deviation (variance SD and SE). Concept of probability.

Text Books Recommended:

1. Introduction to Istrumental analysis by Robert Braun.
2. Instrumental Techniques by Upadhyay and Upadhyay.
3. Instrumental Methods of Chemical Analysis by BK Sharma.
4. Bio statistics; Sunder Rao
5. Statistical Methods; S. P. Gupta; Sultan Chand & Sons

PRACTICAL

M. M. 50

Determination of antibiotic resistance by plating method.
Assaying of microbial enzymes; Catalase, Proteases, Peroxidases,
Cellulase, Cellobioases, Amylase, Diastase.
Exercise on paper, thin layer, column chromatography.
Exercise on paper and gel electrophoresis.
determination of pH of various water and soil sample.
testing of lambert beer's law.
Determination of lamda max of dye by spectrophotometer
Isolation of resistant bacteria from soil and water sample

Scheme of Practical Examination

Time - 4 hours   M.M. 50

1. Exercise on spectrophotometer/ pH meter	10
2. Exercise on chromatography	10
3. Exercise on genetics	05
4. Spotting (1-5)	10
5. Viva-Voce	05
6. Sessional	10

Total 50

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MICROBIOLOGY
BSc-3rd

Paper- I: Medical Microbiology and Immunology

UNIT-1: AIR BORNE DISEASES
Air borne diseases: Types- Tuberculosis, Pertussis, Diphtheria, Influenza, Small & Chicken pox, Mumps, Measles. Symptoms, treatment and prevention.

UNIT-2: WATER BORNE DISEASES
Concept and cause of water borne diseases; Types, Hepatitis, Dysentery, Diarrhea, Cholera, typhoid. Symptoms, treatment and prevention.

UNIT-3: CLINICAL DISEASE AND DIAGNOSIS
Clinical diseases: Diabetes, Asthma, multiple sclerosis, rheumatoid arthritis, cancer. Symptoms, Treatment and prevention.

UNIT-4: 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, adjuvants, Immuno-globulins: Structure types, Properties and their function - Theory of antibody production.

UNIT-5: IMMUNO DISEASE DIAGNOSIS
Methods based on Ag-Ab interaction- precipitation, agglutination, ELISA, RIA, Immuno-electrophoresis, PCR based diagnosis method for infectious diseases.

Text Books Recommended:

1. Immunology: Kuby.
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.

Paper- II: Environmental, industrial and Agricultural Microbiology

UNIT-1: 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-2: 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-3: 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-4: 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-5: 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

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 heamoglobin.
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- 50

B.A./B.Sc. – First Year

Session : 2018-19

Name of the Subject   :-   Anthropology

Paper   : -   First

Name of the Paper   :-   FOUNDATION   OF ANTHROPOLOGY

Total Marks : 50   Pass Marks : 17

Syllabus

UNIT – I   Meaning and scope of Anthropology. History of Anthropology. Branches of Anthropology -
- (a) Socio-cultural Anthropology
- (b) Physical Biological Anthropology
- (c) Archaeological Anthropology
- (d) Linguistic Anthropology

UNIT – II   Relationship of Anthropology with other disciplines: Life Sciences, Medical Sciences, Social Sciences: History, Economics, Sociology, Psychology, Political Science

UNIT – III   Foundation in Biological Anthropology
- (a) Human Evolution with respect to Hominid fossils
- (b) Human Variation: Types and causes
- (c) Human Genetics: Concept, scope and branches
- (d) Human growth and development: Definition, scope, methods and factors effecting human growth and development

UNIT – IV   Fundamentals in Social-Cultural Anthropology.
- (a) Culture, Society, Community, Group, Institution
- (b) Human Institution:-
     Family: Definiton, types and function of family
     Marriage: Definition, forms of marriage and its functions
     Kinship: Definition, types and functions
     Religion: Theories on the origin of religion
- (c) Basic techniques of data collection :
     Observation , Schedule, Questionnaire, Geneology

UNIT – V   Fundamentals in Archaeological Anthropology.
- (a) Tool typology & Technology: Paleolithic, Mesolithic & Neolithic
- (b) Cultural evolution: Broad outlines of cultures (Stone age to metal age)
- (c) Dating techniques in archaeology

B.A./B.Sc. – First Year
Session : 2018-19

Name of the Subject   :-   Anthropology

Paper   : -   Second

Name of the Paper   :-   PHYSICAL/ BIOLOGICAL ANTHROPOLOGY

Total Marks : 50   Pass Marks : 17

Syllabus

UNIT – I   Meaning, scope, History of Physical Anthropology & its applied aspects
Theories of organic evolution: Lamarckism, Neo-lamarckism, Darwinism, Neo-darwinism & Synthetic theory of evolution

UNIT – II   Position of Man in animal kingdom, Classification of living primates, Comparative anatomy of Man and Apes (with special reference to skull, pelvis, dentition and long bones)

UNIT – III   Fossil evidence of human evolution: Ramapithecus, Australopithecus, Pithecanthropus, Sinanthropus, Neanderthal, Cromagnon, Grimaldi man, Chancelade man.

UNIT – IV   Concept of Race: Race formation and Criteria of racial classification, UNESCO Statement, Racial element in India, Major races of the world.

UNIT – V   Human Genetics:
      a.   Structure of Chromosome, DNA & RNA
      b.   Mendelian principle.
      c.   Types of Inheritance in Human

B.A./B.Sc. – First Year

Session : 2018-19

Name of the Subject   :-   Anthropology

Paper   : -   Practical

Name of the Paper   :-   OSTEOLOGY AND CRANIOMETRY

Total Marks : 50   Pass Marks : 17

I.   Identification of bones of human Skeleton. Sketching and labeling of various normas of skull, Overview of Pectoral & Pelvic girdles, Femur & Humerus bone

II.   Craniometry :-
1. Maximum Cranial length.
2. Maximum Cranial Breadth.
3. Maximum frontal Breadth.
4. Bizygomatic Breadth.
5. Nasal Height.
6. Nasal Breadth
7. Minimum frontal breadth
8. Bimaxillary Breadth.
9. Maximum Biorbital Breadth
10. Length of magnum foramen.

III.   Craniometric indices :
1.   Cranial Index
2.   Nasal Index

B.A./B.Sc. – Second Year

Session : 2018-19

Name of the Subject   :-   Anthropology

Paper   : -   First

Name of the Paper   :-   ARCHAEOLOGICAL ANTHROPOLOGY

Total Marks : 50   Pass Marks : 17

Syllabus

UNIT – I   Meaning and scope of Archaeological Anthropology, branches of Archaeology: Classical Archaeology, Historical Archaeology, Prehistoric Archaeology and Protohistoric Archaeology. Anthropology as Archaeology. Differences between the Old world and new world Archaeological Traditions. Absolute and Relative Dating.

UNIT – II   Geological time scale. The Great Ice Age
              Stratigraphy and other evidences of Ice Age: River terraces. Moraines etc. Pluvial and interpluvials
              Stone Age tools: Types and Technology.

UNIT – III   Age of Paleolithic savagery :
              European lower Paleolithic period : Stone tools and cultures
              Indian lower Paleolithic period: Sohan Culture & Madrasian Culture.
              European Middle Paleolithic Period: Tools & culture ; Flake took complex in India
              European Upper Paleolithic period; Tools and Culture, main characteristics of the European Paleolithic Home and Cave art and its significance.

UNIT – IV   Mesolithic complex in North Europe. Mesolithic complex in Western Europe, Mesolithic Culture in India. Chief feature of Neolithic revolution. Neolithic complex in India.

UNIT – V   Metal Age: Copper, Bronze and Iron Age
              Urban revolution: General Features
              Indus valley civilization: Main Features, Town Planning, Economic activities, origin and decay

B.A./B.Sc. – Second Year
Session : 2018-19

Name of the Subject   :-   Anthropology

Paper   : -   Second

Name of the Paper   :-   TRIBAL CULTURE OF INDIA

Total Marks : 50   Pass Marks : 17

Syllabus

UNIT-I   Define tribe and scheduled tribe. Geographical distribution of Indian tribes and their racial and linguistic classification. Contribution of Anthropology in the study of Indian tribes.

Sacred complex, Universalisation and parochialisation, Sanskritisation, westernization, dominant caste.

Tribes and caste, Difference between S.C. and S.T.

Particularly Vulnerable Trible Group (PVTG) of Chhattisgarh (Kamar, Birhor, Hill Korwa. Abujhmariya, Baiga)

UNIT-II   Primitive economy:-

Stages of tribal economy: Hunting, food gathering, fishing, shifting and settled agriculture.

Concept of Property and ownership in tribal societies

Problems of tribal people: land alienation, bonded labour, indebtedness, shifting cultivation, irrigation, Unemployment, agricultural labour; Forest and Tribals

New economic anthropology: Exchange- Gifts, barter, trade, ceremonial exchange and market economy

UNIT-III   The problems of culture contact: Problems due to urbanization and industrialization, Regionalism

Tribal religion: origin & function, animism, totemism.

Concept and practices of Magic and witchcraft, shamanism, head hunting.

UNIT-IV   Political organisation of Indian tribes: Distinction between state and stateless society, law in primitive society

Social organization of Indian Tribes: Matriarchal and patriarchal family,. Lineage and clan, Ways of acquiring mates in tribal societies.

Youth dormitories: Type, organisation and functions.

UNIT-V   Tribal development: History of tribal development, the constitutional safeguards for the scheduled tribes.

Tribal problem: isolation, migration, acculturation, detribalization.

Policies, plans and programmes of tribal development and their implementation. Tribal revolts in India.

Contributions of anthropology to tribal development.

Response of the tribal people for development programs of government and NGO

Recommended Readings:

1. Chaudhary, Bhudadeb (Ed.). Tribal Development in India.
2. Elwin,V.A. Philosophy for NEFA.
3. Haimendorf. The Tribes of India: Struggle for survival.
4. Shara B.D. Basic Issues in tribal Development.

B.A./B.Sc. – Second Year
Session : 2018-19

Name of the Subject   :-   Anthropology

Paper   : -   Practical

Name of the Paper   :-   MATERIAL CULTURE AND RESEARCH TOOLS

Total Marks : 50   Pass Marks : 17

OBJECTIVES :

The objective of this practical course is to introduce the student with the primitive material culture and technology used by primitive man and the student will be introduced with various techniques commonly used by social Anthropology.

MATERIAL CULTURE :

Part – I.   Identification and technological descriptions of the following.
1. Implements for food gathering, hunting, fishing and agriculture
2. Fire making implements
3. Types of habitations
4. Land and water transport

Part-II   Sketching, identification and the description of Paleolithic, Mesolithic and Neolithic tools

(It is essential that students should draw at least five tools of each age)

Part- III   Construction of schedule, Geneology and Questionnaire

Each student should collect information through above tools from 10 Respondents.

The Student will be required to maintain practical records of all work done in the practical class.

B.A./B.Sc. – Third Year

Session : 2018-19

Name of the Subject   :-   Anthropology

Paper   : -   First

Name of the Paper   :-   "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, 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. – Third Year
Session : 2018-19

Name of the Subject   :-   Anthropology

Paper   : -   Second

Name of the Paper   :-   THEORIES IN SOCIAL-CULTURAL
                                 ANTHROPOLOGY

Total Marks : 50   Pass Marks : 17

Syllabus

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)

Diffusionism: British , German-Austrian (Kulture kreise) and American diffusionism (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 Kardinar)
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, Geneological Study
Types of Anthropological Methods: Historical Method, Comparative Method and Functional Method.

B.A./B.Sc. – Third Year

Session : 2018-19

Name of the Subject   :-   Anthropology

Paper No.   : -   Practical

Name of the Paper   :-   SOMATOSCOPY, SOMATOMETRY AND
                                         GENETICAL TRAITS

Total Marks : 50   Pass Marks : 17

Syllabus

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.

Part-1   Somatoscopic Observation
                1. Skin colour   4.Hair
                2. Eye   5. Lips
                3. Nose

Part –2   Somatometry:
                (a) Measurements on body:
                1. Height vertex,   6.   Tibiale height,
                2. Height tragus,   7.   Upper extremity length,
                3. Suprasternale height,   8.   Sitting height,
                4. Biacromial Breadth,   9.   Height dactylion,
                5. Bi-illiocristal breadth, 10. Body weight.

                (b) Head and Face Measurement:
                1. Morphological upper facial length. 5. Max head length.
                2. Physiognomic upper facial length. 6. Max head breadth.
                3. Morphological facial length.   7. Nasal length.
                4. Bizygomatic breadth.   8. Nasal breadth.

                (c) Somatometry indices:
                1. Cephalic index.   3. Facial index.
                2. Nasal index.

Part- 3   Genetic Traits:
                ABO blood group. Colour blindness, PTC taste sensitivity, Dermatoglyphics: Methods of taking finger and palm prints and their analysis

Part-4   Statistics: Mean, Median, Standard deviation, X^2 test.

बी.ए./बी. एस–सी. प्रथम वर्ष
सत्र : 2018–19

विषय का नाम :–   मानवविज्ञान

प्रश्न पत्र   :–   प्रथम

प्रश्न पत्र का नाम :–   मानवविज्ञान के आधार

पूर्णांक :– 50   उत्तीर्णांक

:– 17

पाठ्यक्रम

इकाई 1 – मानवविज्ञान का अर्थ एवं क्षेत्र। मानव विज्ञान का इतिहास। मानव विज्ञान की शाखाएँ –

1. सामाजिक–सांस्कृतिक मानव विज्ञान
2. शारीरिक जैविक मानव विज्ञान
3. भाषाई मानव विज्ञान

इकाई 2 – मानवविज्ञान का अन्य विषयों के साथ संबंध : जैवविज्ञान, चिकित्सा विज्ञान, सामाजिक विज्ञान, इतिहास, अर्थशास्त्र, समाजशास्त्र, मनोविज्ञान, राजनैतिक विज्ञान।

इकाई 3 – जैवकीय मानवविज्ञान के आधार

1. मानव उद्विकास, होमिनिड फासिल के संबंध में
2. मानव विभिन्नता : प्रकार एवं कारक
3. मानव अनुवांशिकी : अवधारणा, क्षेत्र एवं शाखाएँ
4. मानव संवृद्धि एवं विकास : परिभाषा, क्षेत्र, पद्धति, एवं मानव संवृद्धि एवं विकास को प्रभावित करने वाले कारक

इकाई 4 – सामाजिक–सांस्कृतिक मानवविज्ञान के आधार।

1. संस्कृति, समाज, समुदाय, समूह एवं संस्था।
2. मानव संस्थाएँ :

परिवार : परिभाषा, प्रकार एवं परिवार के प्रकार्य।

विवाह : परिभाषा, विवाह के स्वरूप एवं उसके प्रकार्य।

नातेदारी : परिभाषा, प्रकार एवं प्रकार्य।

धर्म : धर्म के उत्पत्ति संबंधी सिद्धांत।

3. तथ्य संग्रहण के आधारभूत तकनीक : अवलोकन, अनुसूची, प्रश्नावली एवं वंशावली।

ईकाई 5 – पुरातात्विक मानवविज्ञान के आधार

1. उपकरण प्रारूप एवं तकनीक : पुरापाषाणिक, मध्यपाषाणिक एवं नवपाषाणिक

2. सांस्कृतिक उद्विकास : संस्कृतियों का वृध्द रूपरेखा (पाषाण–युग से धातु–युग)

3. पुरातत्वशास्त्र में काल निर्धारक तकनीक

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विषय का नाम :– मानवविज्ञान

प्रश्न पत्र :– द्वितीय

प्रश्न पत्र का नाम :– शारीरिक / जैविकीय मानवविज्ञान

पूर्णांक :– 50   उत्तीर्णांक

:– 17

पाठ्यक्रम

इकाई 1 – शारीरिक मानवविज्ञान का अर्थ एवं क्षेत्र, इतिहास एवं इसका व्यावहारिक आयाम।
              जैविक उद्विकास के सिद्धांत : लैमार्कवाद, नव–लेमार्कवाद, डार्विनवाद, नव–डार्विनवाद एवं उद्विकास के संश्लेषण सिद्धांत

इकाई 2 – जंतु जगत में मानव का स्थान, जीवित (लिविंग) प्राइमेट का वर्गीकरण, मनुष्य एवं कार्य की तुलनात्मक शारीरिक रचना (कपाल,पेल्विस, दंत एवं लम्बे अस्थियों के विशेष संदर्भ में)

इकाई 3 – मानव उद्विकास के जीवाश्म साक्ष्य : रामाथिथेकस, आस्ट्रेलोपिथेकस, पिथेकेन्थ्रोपस, सिनेएन्थ्रोपस, नियंडरथल, क्रोमेग्नन, ग्रिमाल्डी मानव, चांसलेड मानव।

इकाई 4 – प्रजाति की अवधारणा : प्रजाति निर्माण एवं प्रजातीय वर्गीकरण के मापदंड, यूनेस्को कथन, भारत में प्रजातीय तत्व, विश्व के प्रमुख प्रजाति।

इकाई 5 – मानव अनुवांशिकी :
              1. गुणसूत्र की संरचना, डी.एन.ए. एवं आर.एन.ए.
              2. मेण्डेलियन सिद्धांत
              3. मानव में वंशागतिकी के प्रकार

बी.ए. / बी. एस–सी. प्रथम वर्ष

सत्र : 2018–19

विषय का नाम   :–   मानवविज्ञान

प्रश्न पत्र   :–   प्रायोगिक

प्रश्न पत्र का नाम :–   अस्थिशास्त्र एवं कपालमिति

पूर्णांक :– 50   उत्तीर्णांक

:– 17

पाठ्यक्रम

भाग 1 –   मानव कंकाल के अस्थियों का पहचान। मानव कपाल के विभिन्न संस्थितीयों का चित्रण एवं नामकरण। पेक्टोरल एवं पेल्विक गर्डल, फीमर एवं ह्यूमरस अस्थि की पहचान एवं बाह्य चित्रण।

भाग 2 –   कपालमिति :
1. कपाल की अधिकत लंबाई (मैक्सिमम क्रेनियल लेंथ)
2. कपाल की अधिकतम चौड़ाई (मैक्सिमम क्रेनियल ब्रेथ)
3. माथे की अधिकतम चौड़ाई (मैक्सिमम फ्रंटल ब्रेथ)
4. चेहरे की चौड़ाई (बाई–जायगोमेटीक ब्रेथ)
5. नासिका / नाक की ऊँचाई (नेजल हाईट)
6. नासिका / नाक की चौड़ाई (नेजल ब्रेथ)
7. माथे की न्यूनतम चौड़ाई (मिनीमम फ्रंटेल ब्रेथ)
8. बाई–मेक्सिलरी ब्रेथ
9. आर्बिट की अधिकतम चौड़ाई (बाई आर्बिटल ब्रेथ)
10. महारंध्र की लंबाई (लेंथ ऑफ फोरामेन मेग्नम)

भाग 3 –   कपालमीतिय देशनाएँ –
1. क्रेनियल देशना
2. नेसल देशना

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सत्र : 2018–19

विषय का नाम   :–   मानवविज्ञान
प्रश्न पत्र   :–   प्रथम
प्रश्न पत्र का नाम :–   पुरातात्विक मानवविज्ञान

पूर्णांक :– 50   उत्तीर्णांक
:– 17

पाठ्यक्रम

इकाई 1 –   पुरातात्विक मानवविज्ञान का अर्थ एवं क्षेत्र, पुरातात्विक मानवविज्ञान की शाखाएँ : शास्त्रीय पुरातत्वशास्त्र, ऐतिहासिक पुरातत्वशास्त्र, पुरा–ऐतिहासिक पुरातत्वशास्त्र एवं आध–ऐतिहासिक पुरातत्वशास्त्र, पुरातत्वशास्त्र के रूप में मानवविज्ञान। प्राचीन विश्व एवं नव युग पुरातत्वशास्त्रीय परंपराओं के मध्य अंतर।
सापेक्ष एवं निरपेक्ष काल निर्धारण।

इकाई 2 –   भू–गर्भीय समय सारणी, महान हिमयुग
हिमयुग के स्तरीकरण एवं अन्य प्रमाण : नदी वेदिकाएँ, हिमोढ़, अतिवृद्धि अनावृद्धि, पाषाण काल उपकरण : प्रकार एवं तकनीक।

इकाई 3 –   पुरापाषाणिक बर्बरता की आयु :
यूरोपीयन निम्न पुरापाषाणिक काल : पाषाण उपकरण एवं संस्कृतियाँ।
भारतीय निम्न पुरापाषाणिक काल : सोहन संस्कृति एवं मद्रासीयन संस्कृति।
यूरोपीयन मध्य पुरापाषाणिक काल : उपकरण एवं संस्कृति
भारत में फ्लैक उपकरण संकुल
यूरोपीयन उच्च पुरापाषाणीक काल : उपकरण एवं संस्कृतियाँ, यूरोपीयन पुरापाषाणिक गृह एवं गुफा कला के महत्व एवं लक्षण।

इकाई 4 –   उत्तरी यूरोप में मध्यपाषाणिक संकुल।
पश्चिमी यूरोप में मध्यपाषाणिक संकुल।
भारत में मध्यपाषाणिक संस्कृति।
नवपाषाणिक क्रान्ति के मुख्य लक्षण
भारत में नवपाषाणिक संकुल

इकाई 5 –   धातु युग : ताम्र,   कांस्य एवं लैह युग। नगरीय क्रांति : सामान्य लक्षण

सिंधु घाटी सभ्यता : मुख्य लक्षण, शहर नियोजन, आर्थिक क्रियाविधि, उत्पत्ति एवं पतन।

बी.ए./बी. एस–सी. द्वितीय वर्ष

सत्र : 2018–19

विषय का नाम   :–   मानवविज्ञान

प्रश्न पत्र   :–   द्वितीय

प्रश्न पत्र का नाम :–   भारत में जनजातीय संस्कृति

पूर्णांक :– 50   उत्तीर्णांक
:– 17

पाठ्यक्रम

इकाई 1 –   जनजाति एवं अनुसूचित जनजाति की परिभाषा। भारतीय जनजातियों के भौगोलिक वितरण एवं उनके प्रजातीय एवं भाषायी वर्गीकरण, भारतीय जनजातियों के अध्ययन में मानवविज्ञान का योगदान।

पवित्र संकुल, सार्वभौमिकता एवं स्थानीयता, संस्कृतिकरण, पश्चिमीकरण, प्रभु–जाति।

जनजाति एवं जाति, अनुसूचित जनजाति एवं अनुसूचित जाति के मध्य अंतर।

छत्तीसगढ़ के विशेष रूप से कमजोर जनजाति (कमार, बिरहोर, पहाड़ी कोरवा, अबूझमाड़िया एवं बैगा)

इकाई 2 –   आदिम अर्थव्यवस्था :

जनजाति अर्थव्यवस्था के स्तर : शिकार, खाद्य–संग्रहण, मतस्यमारण, स्थानांतरित एंव स्थायी कृषि।

संपत्ति की अवधारणा एवं जनजातीय समाजों में स्वामित्व।

जनजातीय लोगों की समस्याएँ : भूमि अधिग्रहण, बंधुवा मजदूरी, ऋणग्रस्तता, स्थानांतरित कृषि, सिंचाई, बेरोजगारी, कृषि मजदूरी, जंगल और जनजातीयाँ।

नव–आर्थिक मानवविज्ञान : विनिमय – उपहार, वस्तु विनिमय, व्यापार, सांस्कृतिक विनिमय एवं बाजार अर्थव्यवस्था।

इकाई 3 –   सांस्कृतिक संपर्क की समस्या : शहरीकरण एवं औद्योगीकरण संबंधी समस्याएँ, क्षेत्रवाद, जनजातीय धर्म : उत्पत्ति एवं प्रकार्य, आत्मावाद, टोटमवाद,

अभिचार एवं जादू की अवधारणा एवं क्रियाकलाप, शमनवाद,सिरछेदन।

इकाई 4 — भारतीय जनजातियों के राजनैतिक संगठन : राज्य एवं राज्याविहीन समाज के मध्य अंतर। आदिम समाज में कानून

भारतीय जनजातियों में सामाजिक संगठन : मातृस्वामित्व एवं पितृस्वामित्व परिवार, वंश एवं गोत्र, जनजातीय समाजों में विवाह साथी चुनने के तरीके।

युवागृह : प्रकार, संगठन एवं प्रकार्य।

इकाई 5 — जनजातीय विकास : जनजातीय विकास का इतिहास, अनुसूचित जनजातियों के लिए संवैधानिक प्रावधान। जनजातीय समस्याएँ : पृथककरण, प्रवासन, संस्कृति संक्रमण अजनजातीयकरण।

जनजातीय विकास की नीतियाँ, योजना एवं कार्यक्रम एवं उनका क्रियान्वयन।

भारत में जनजातीय असंतोष।

जनजातीय विकास में मानवविज्ञान का योगदान।

सरकारी एवं गैर–सरकारी विकासीय कार्यक्रमों के प्रति जनजातीय लोगों की प्रतिक्रिया।

बी.ए. / बी. एस–सी. द्वितीय वर्ष
सत्र : 2018–19

विषय का नाम   :–   मानवविज्ञान
प्रश्न पत्र   :–   प्रायोगिक
प्रश्न पत्र का नाम :–   भौतिक संस्कृति एवं शोध उपकरण

पूर्णांक :– 50   उत्तीर्णांक
:– 17

पाठ्यक्रम

उद्देश्य –   इस प्रश्न–पत्र का प्रमुख उद्देश्य छात्र–छात्राओं को आदिम भौतिक संस्कृति एवं प्रोद्योगिकी से परिचय कराना है। साथ ही सामाजिक मानवविज्ञान में समान्य रूप से उपयोग होने वाली तकनीकी का भी ज्ञान करना है।

भौतिक संस्कृति –
भाग 1 –   दिये गऐ भौतिक संस्कृतियों की पहचान एवं तकनिकी का वर्णन –
1. खाद्य संकलन, शिकार, मतस्य आखेट एवं कृषि उपकरणों का विवरण।
2. आग उत्पन्न करने वाली विधि एवं उपकरणों का वर्णन।
3. आवास के प्रकार का वर्णन।
4. भूमि एवं जल यातायात को साधनों का वर्णन।

भाग 2 –   पुरापाषाण काल, मध्यपाषाण काल एवं नव–पाषाण काल के उपकरणों की पहचान, चित्रण एवं विवरण।
(प्रत्येक काल के पाँच उपकरणों का विवरण देना आवश्यक है।)

भाग 3 –   अनुसूची, वंशावली एवं प्रश्नावली का निर्माण।
प्रत्येक छात्र–छात्राओं को उपरोक्त उपकरण के माध्यम से 10 उत्तदाताओं से आंकड़ों की जानकारी प्राप्त करना चाहिए।
प्रत्येक छात्र–छात्राओं को प्रायोगिक कक्षा के दौरान इन समस्त भाग से संबंधित प्रायोगिक आँकड़े को प्रायोगिक फाईल में दर्ज करना आवश्यक है।

बी.ए./बी. एस–सी. तृतीय वर्ष
सत्र : 2018–19

विषय का नाम   :–   मानवविज्ञान

प्रश्न पत्र   :–   प्रथम

प्रश्न पत्र का नाम :–   मानव आनुवांशिकी, मानव संवृद्धि एवं पोषण के आधार

पूर्णांक :– 50   उत्तीर्णांक :– 17

पाठ्यक्रम

इकाई 1 –   मानव आनुवांशिकी : इतिहास, उद्देश्य, क्षेत्र एवं मानव समाज में इसकी उपयोगिता

कोशिका विभाजन : समसूत्रीय विभाजन एवं अर्द्धसूत्री विभाजन मेण्डलवाद

गुणसूत्र : सामान्य एवं असामान्य गुणसूत्र

जीन्स की अवधारणा, डी.एन.ए. एवं आर.एन.ए.। अनुवांशिकता के प्रकार : दैहिक

(प्रभावी एवं अप्रभावी) एवं लिंग–सहलग्न अनुवांशिकता।

इकाई 2 –   मानव संवृद्धि – मानव संवृद्धि की परिभाषा एवं कार्यक्षेत्र, मानव संवृद्धि एवं विकास की अध्ययन विधियाँ, वयता।

इकाई 3 –   यमज/यमल के प्रकार एवं आनुवंशिक अन्वेषण में इसका महत्व।

ए.बी.ओ. रक्त समूह की अनुवांशिकता, पी.टी.सी (फिनाईल थायो कार्बामाईड), कलर ब्लाइंडनेस एवं डर्मेटोग्लायफिक्स, जेनेटिक काउंसलिंग, यूजेनिक्स।

इकाई 4 –   पोषण : सामान्य संवृद्धि के लिए आवश्यक पोषक तत्व। सामान्य पोषण संबंधी रोग (प्रोटीन, वसा, कार्बोहाइड्रेट, खनिज–लवण विटामिन)।

इकाई 5 –   पारिस्थीतिकी : परिभाषा एवं कार्यक्षेत्र, मानव पारिस्थीतिकी तंत्र के प्रकार, पारिस्थितिकीय प्रदूषण।   जैविकीय जनांकिकी : परिभाषा, प्रकृति एवं कार्यक्षेत्र।

जनांनांकीय रूपरेखा : प्रजननता/उर्वरता, मर्त्यता, रूग्णता।

बी.ए./बी. एस–सी. तृतीय वर्ष
सत्र : 2018–19

विषय का नाम :–   मानवविज्ञान
प्रश्न पत्र :–   द्वितीय
प्रश्न पत्र का नाम :–   सामाजिक–सांस्कृतिक मानवविज्ञान के सिद्धान्त

पूर्णांक :– 50   उत्तीर्णांक
:– 17

पाठ्यक्रम

इकाई 1 –   सामाजिक–सांस्कृतिक मानवशास्त्रीयों का योगदान –
1. इमाईल दुर्खीम
2. फ्रांस बोआस
3. राबर्ट रेडफील्ड
4. अल्फ्रेड लुईस क्रोब्रर
5. श्यामचरण दुबे
6. एम.एन श्रीनीवास
7. एल.पी. विद्यार्थी

इकाई 2 –   उद्विकास : जैविकी एवं सांस्कृतिक उद्विकास।
उद्विकासवाद : शास्त्रीय उद्विकासवाद – (ई.बी. टायलर एवं एल.एच. मार्गन, नवउद्विकासवाद : (लेसली व्हाईट एवं गार्डन चाइल्ड)। प्रसारवाद : ब्रिट्रिश, जर्मन–आस्ट्रीयन (कल्चर क्रीश) एवं अमेरिकन। प्रसारवाद (सांस्कृतिक तत्व, सांस्कृतिक संकुल, सांस्कृतिक क्षेत्र, सांस्कृतिक केन्द्र)

इकाई 3 –   प्रकार्य एवं संरचना :
प्रकार्यवाद (मेलीनोवस्की)
संरचना–प्रकार्यवाद (रेडक्लिफ ब्राउन)
संरचनावाद (लेविस्ट्रास)

इकाई 4 –   व्यैक्तित्व एवं संस्कृति :
आधारभूत व्यक्तित्व एवं आधुनिक व्यक्तित्व (कोरा–डू–बॉयस, अब्राहम कार्डीनर)
सांस्कृतिक प्रतिमान : संरूपणवाद (रूथ बेनेडिक्ट)
राष्ट्रीय चरित्र अध्ययन में मानवशास्त्रीय योगदान
राष्ट्रीय चरित्र अध्ययन में मार्गेड मीड का योगदान

इकाई 5 – मानवविज्ञान में क्षेत्रकार्य परम्परा
शोध के प्रमुख उपकरण : अनुसूची, प्रश्नावली, अवलोकन, साक्षात्कार, व्यैकितत्व अध्ययन, वंशावली अध्ययन।
मानवशास्त्रीय अनुसंधान पद्धति के प्रकार – ऐतिहासिक पद्धति, तुलनात्मक पध्दति एवं क्रियात्मक पद्धति

बी.ए./बी. एस–सी. तृतीय वर्ष

सत्र : 2018–19

विषय का नाम :– मानवविज्ञान

प्रश्न पत्र :– प्रायोगिक

प्रश्न पत्र का नाम :– शारीरिकवलोकन, शरीरमिती एवं अनुवांशिक तत्व

पूर्णांक :– 50   उत्तीर्णांक

:– 17

पाठ्यक्रम

उद्देश्य – इस प्रायोगिक विषय का प्रमुख उद्देश्य छात्र–छात्राओं को मानवविज्ञान में उपयोग होने वाली उपकरण एवं विधि, विश्लेषण एवं सांख्यिकी विधि से परिचय कराना है। साथ ही प्रयोगशाला में रक्त–समूह की जाँच, त्वचारैखिकीय प्रतिरूपों की पहचान करना साथ ही साथ उनके व्यवहारिक उपयोगिता का जानकारी प्रदान करना।

भाग 1 – शारीरिकवलोकन

अ. स्किन कलर (त्वचा रंग)

ब. आई (आंख／नेत्र)

स. नोश (बाल／केश)

द. बाल

इ. लीप (होंठ／ओस्ट्र)

भाग 2 – शरीरमीति :

अ. शारीरिक माप

1- हाईट वर्टैक्स (संपूर्ण ऊँचाई)

2- हाईट ट्रेगस (कंठतक ऊँचाई)

3- सुप्रास्टर्नल हाईट (स्टर्नम तक की ऊँचाई)

4- बाई एक्रोमियल ब्रेथ (कंधे की चौडाई)

5- बाई–इलिहयोक्रिस्टियल ब्रेथ (कमर की चौड़ाई)

6- टीबियल हाईट (घूटने तक की ऊँचाई)

7- अपन एक्ट्रीमिटी लेन्थ

8- सिटींग हाईट (बैठी अवस्था में ऊँचाई)

9- हाईट डेक्टीलीआन (धरातल से डेक्टीलियॉन तक की ऊँचाई)

10- बॉडी वेट (शारीरिक भार ⁄ वजन)

ब. सिर एवं चेहरे की माप

1- मार्फोलोजिकल अपर फेशियल लेंथ (ऊपरी चेहरे की अकारकीय लंबाई)

2- फिजीयोगनॉमिक अपर फेशियल लेंथ (उपरी चेहरे की संपूर्ण लंबाई)

3- मार्फोलॉजिकल फेशियल लेंथ (चेहरे की संपूर्ण लंबाई)

4- बाईजाइगोमेटिक ब्रेथ (चेहरे की चौड़ाई)

5- मैक्सिमम हेड लेंथ (सिर की अधिकत चौड़ाई)

6- मैक्सिमम हेड ब्रेथ (सिर की अधिकत ऊँचाई)

7- नेजल लेंथ (नाक की अधिकतम लंबाई)

8- नेजल ब्रेथ (नाक की अधिकतम चौड़ाई)

स. शरीरमिति सूचकांक ⁄ देशना

9- सिफेलिक देशना

10- नेशल देशना

11- फेसियल देशना

भाग 3 – आनुवांशिक तत्व
ए.बी.ओ. रक्त समूह, वर्णान्धता ⁄ रंग अंधता, पी.टी.सी. स्वाद संवेदनशीलता अध्ययन, त्वचारेखिकीय : ऊँगलीयों एवं हथेलियों के छाप तथा विश्लेषण करने की विधि।

भाग 4 – सांख्यिकीय : समान्तर माध्य, मध्यिका, प्रमाप विचलन काई स्कायर परीक्षण (x^2 जमेजण)

Syllabus for B.A./ B.Sc. Course, 2018-19
Subject:. Statistics

Each year of B.A./B.sc. I, II, III shall have two theories and one practical course. All the Theory as well as Practical Examinations will be of 3 hours duration. In each practical examination 10% marks shall be fixed for viva –voce and 20% marks for practical record.

Scheme of Examination

	Title of the paper	MAX. Marks
B.A./B.Sc. I	Paper-I (Code No. 0803) : Probability I Paper-II (Code No. 0804): Descriptive Statistics I Paper III: Practical- Based on Theory Papers I & II	50 50 50
	Total	150
B.A./B.Sc. II	Paper-I (Code No. 0853): Statistical Methods Paper-II (Code No. 0854): Sampling Theory and Design of Experiments Paper III: Practical- Based on Theory Papers I & II	50 50 50
	Total	150
B.A./B.Sc. III	Paper I (Code No. 0907): Applied Statistics Paper II (Code No. 0908): Statistical Quality Control and Computational Techniques Paper III: Practical- Based on Theory Papers I & II	50 50 50
	Total	150

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B.A./B.Sc. –I
Subject-Statistics
Paper – I (Paper Code-0803)
PROBABILITY THEORY

</div>

Unit-I

Important concepts in probability: Random experiment: trial, sample point and sample space, event, Operations of events, concepts of mutually exclusive and exhaustive events. Definition of probability: classical and relative frequency approach. Richard Von Misses, Cramer and Kolmogrove approachesto probability, merits and demerits to these approaches, any general idea to be given. Discrete probability space, Properties of probability based on axiomatic approaches, Independence of events, Conditional probability, total and compound probability rules, Baye's theorem and its applications.

Unit-II

Random variables: Definition of discrete random variable (rv); probability mass function (pmf) and cumulative distribution function (cdf). Joint pmf of several discrete rvs. Marginal and conditional pmfs. Independence of rvs. Idea of continuous random variables, probability density function, illustration of random variables and its properties. Expectation of a random variable and its properties -moments,

measures of location and dispersion, skewness and kurtosis, Moment generating function, raw and central moments, Probability generating function (pgf) and, their properties and uses.

Unit-III
Standard univariate discrete distributions: degenerate, discrete uniform, hypergeometric, Poisson, geometric and negative binomial distributions. Marginal and conditional distributions, Distributions of functions of discrete rvs, reproductive property of standard distributions.

Unit-IV
Univariate continuous distributions and their properties: Uniform, Beta, Gamma, Exponential, Normal, Cauchy, Lognormal. Moment generating function (mgf) : its properties and applications.
Tchebycheff's inequality and applications, statements and applications of weak law of large numbers and central limit theorems.

Unit-V
Four short notes, one from each unit will be asked. Students have to answer any two.

REFERENCES
1. Bhat B.R.,Srivankataramana T. and Rao Madhav K.S. (1997): Statistics; A Beachners Vol. II, New Age International (P) Ltd.
2.Chung, K.L. (1979). Elementary Probability Theory with Stochastic Processes, Springer International Student Edition.
3. Edward P.J., Ford J.S. and Lin (1974): Probability for Statistical Decision-Marketing. Prentice Hall
4. Goon A.M., Gupta M.K. and Dasgupta B.(1999): Fundamentals of Statistics, Vol. I , World Press, Calcutta
5. Mood A.M., Grabill F.A. and Bose D.C.(1974): Introduction to the theory of Statistics, Mc. Graw Hall.

ADDITIONAl REFERENCES:
6. Cook, Cramer and Clark (): Basic Statistical Computing, Chapman and Hall.
7.David Stirzaker (1994). Elementary Probability, Cambridge University Press.
8.Feller, W. (1968). An Introduction to Probability Theory and its Applications, Wiley.
9. Hoel P.G. (1971): Introduction to Mathematical Statistics
10. Mayer P.L. (1970): Introductory Probability and Statistical Applications, Addition Wesley
11.Mukhopadhyay, P. (1996). Mathematical Statistics, New Central Book Agency, Calcutta.
12.Parzen, E. (1960). Modern Probability Theory and its Applications, Wiley Eastern.
13Pitman, Jim (1993). Probability, Narosa Publishing House.

Paper – II(Paper Code-0804)
DESCRIPTIVE STATISTICS

Unit - I
Origin and Development of statistical importance, uses and limitations of Statistics. Types of Data: Concepts of a statistics population and sample from a population; qualitative and quantitative data;

nominal and ordinal data; cross sectional and time series data; discrete and continuous data; frequency and non-frequency data.

Collection and Scrutiny of Data; Primary data – designing a questionnaire and a schedule; checking their consistency. Secondary data – their major sources including some government publications. Complete enumeration, controlled experiments, observational studies and sample surveys. Scrutiny of data for internal consistency and detection of errors of recording. Ideas of cross-validation.

Presentation of Data: Construction of tables with one or more factors of classification. Diagrammatic and graphical representation of non-frequency data. Frequency distributions, cumulative frequency distributions and their graphical and diagrammatic representation – column diagram, histogram, frequency polygon and ogives. Stem and leaf chart. Box plot.

Unit -II
Analysis of Quantitative Data: Univariate data: Concepts of central tendency or location, and their measures; arithmetic, geometric and harmonic mean, median and mode.

Unit -III
Dispersion and relative measures of dispersion, skewness and kurtosis, and their measures including those based on quartiles and moments. Sheppard's corrections for moments for grouped data (without deviation).

Unit -IV
Bivariate data: Scatter diagram. Product moment correlation coefficient and its properties. Coefficient of determination. Correlation ratio. Concepts of regression. intra-class correlation coefficient with equal and unequal group sizes. Rank correlation – Spearman's and Kendall's measures. Correlation index. Principle of least squares. Fitting of linear and quadratic regression and related results.   Fitting of curves reducible to polynomials by log and inverse transformation. Multivariate data: Multiple regression, multiple correlation and partial correlation in 3 variables. Their measures and related results.

Unit V
 Four short notes, one from each unit will be asked. Students have to answer any two.

REFERENCES
1. Bhat B.R.,Srivankataramana T. and Rao Madhav K.S. (1997): Statistics; A Beachners Vol. II, New Age International (P) Ltd.
2.Croxton FE, Cowden DJ and Klein S: Applied General Statistics (1973): Prentice Hall of India.
3.Goon A.M., Gupta M.K., Dasgupta B. Fundamentals of Statistics, Vol. 1(1991) & Vol. 2(2001). World Press, Calcutta.
5.Gupta V.K. and Kapor S.C. : Fundamentals of Mathematical Statistics S. Chand and Sons.
ADDITIONAl REFERENCES:
 6.Cook, Cramer and Clark (): Basic Statistical Computing, Chapman and Hall.
7. Mood A.M., Grabill F.A. and Bose D.C.(1974): Introduction to the theory of Statistics, McGraw Hill.
8.Snedecor GW and Cochran WG: Statistical Methods (1967) : Lowa State University Press.

9.Spiegel, MR (1967): Theory & Problems of Statistics (1967): Schaum's Publishing Series.

Paper III:
Practical : Practicals Based on Paper I & II

1. Presentation of data by Frequency tables, diagrams and graphs.
2. Calculation of Measures of Central Tendency, dispersion , skewness and kurtosis
3. Product Moment Correlation and Correlation Ratio
4. Fitting of Curves by the least square method
5. Regression of two variables
6. Spearman's Rank correlation Coefficient
7. Multiple regression of three variables
8. Multiple correlation and partial correlation
9. Evaluation of probabilities using addition and multiplication theorems, conditional probabilities and Bayes theorems
10. Exercises on mathematical expectations and finding measures of central tendency, dispersion, skewness and kurtosis of univariate probability distributions
11. Fitting of univariate and conditional distributions

B.A./B.Sc. –II
Subject: Statistics
Paper-I(Paper Code-0853)
Statistical Methods

Unit I
Sampling from a distribution : Definition of a random sample ,simulating random sample from standard distributions(uniform, Normal, Exponential) ,concept of derived distributions of a functions of random variables, concept of a statistics and its sampling distribution. Point estimate of a parameter. Properties of a good estimator, Concept of bias and standard error of an estimate .Standard errors of sample mean, sample proportion. Sampling distribution of sum of Binomial, Poisson and mean of Normal distributions. Independence of sample mean and variance in random sampling from a Normal distribution (without derivation).

Unit II
Statistical tests and interval estimation: Null and alternative hypothesis. Types of errors, level of significance, p values, one and two tailed tests, Procedure for testing of hypothesis. Statement of chi-squares, Student's t and F statistics. Testing for the single mean and variance of a univariate normal distribution, testing the equality of two means and testing for the equality of two variances of two univariate normal distributions. Related confidence intervals. Testing for the significance of sample correlation in sampling from bi-variate normal distribution and for equality of means and equality of variances in sampling from bivariate normal populations.

Unit III
Large sample tests: use of central limit theorem for testing and interval estimation of a single mean and a single proportion and difference of two means and two proportions, Fisher's Z transformation and its

uses. Pearson's chi-square test for goodness of fit and for homogeneity for standard distributions. Contingency table and test of independence in a contingency table.

Unit IV
Nonparametric tests : Definition of order statistics and their distributions, Non-parametric tests, Sign test for univariate and bivarite distributions, Wilcoxon test, Mann-Whitney test, Run test, median test and Spearman's rank correlation test.

Unit V
 Four short notes, one from each unit will be asked. Students have to answer any two.

REFERENCES

1. Frund J.E.(2001)Mathematical Statistics, Prentice Hall of India.
2.Goon A.M., Gupta M.K., Das Gupta.B. (1991):Fundamentals of Statistics, Vol.I, World Press, Culcutta.
3. Gupta and Kapoor: Fundamentals of Mathematical Statistics S.Chand & Sons.
4.Hodges, J.L. and Lehman E.L. (1964): Basic Concepts of Probability and Statistics, Holden Day.
5.Mood A.M, Graybill F.A and Boes D.C. (1974): Introduction to the Theory of Statistics, McGraw Hill.

ADDITIONAL REFERENCES

1..Bhat B.R., Shrivenkatramana T and Rao Madhava K.S. (1997): A Beginner's Text, Vol. II, New age International (P) Ltd.
2. Rohatgi, V.K. (1967): An Introduction to Probability Theory and Mathematical Statistics, John Wiley & Sons.
3. Snedecor, G.W. and Cochran W.G. (1967): Statistical Methods. Lowa State University Press.

Paper-II (Paper Code-0854)
Sampling Theory and Design of Experiments
Unit I
Concepts of population   and sample, need for sampling ,Census and sample survey , Basic concepts in sampling , organizational aspects of survey sampling, sample selection and sample size .
Some basic sampling methods – simple random sampling (SRS) with and without replacement.

Unit II
Stratified random sampling , Systematic sampling , Allocation problems, ratio and regression methods of estimation under SRS.
 Non-sampling errors, aquitance of working (questionnaires, sampling design, methods followed in field investigation, principal findings, etc) of NSSO and other agencies undertaking sample surveys.

Unit III
Analysis of   variance for one way and two-way classifications. Need   for design of experiments, fundamental principal of design, basic designs- CRD, RBD, LSD and their analysis.

Unit IV

Missing plot technique. Analysis of co-variance. Factorial experiments : 2^2, 2^3 factorial experiments, illustrations, main effects and interactions, confounding and illustrations. Yates method of finding treatment totals.

Unit V

Four short notes, one from each unit will be asked. Students have to answer any two.

REFERENCES

1. Cocran W.G. (1977): Sampling Techniques, John Wiley and Sons.
2. Des Raj (2000): Sample Survey Theory, Narosa Publishing House.
3. Murthy M.N(1967): Sampling Theory and Methods, Statistical Publishing Society, Calcutta.
4. Singh, D. and Chaudhary,F.S. (1986): Theory and analysis of Sample Survey Designs. New Age International Publisher.
5. Sukhatme P.V., Sukhatme B.V., Sukhatme S. and Ashok C.(1984), : Sample Survey Methods and Its Applications, Indian Society of Agricultural Statistics, New Delhi.
6. Das M.N. and Giri (1986) : Design and analysis of experiments,springer verlag.
7. Goon A.M.,Gupta M.K.,Das Gupta B. (1986): Fundamentals of Statistics, Vol.II, World Press, Culcutta.
8. Joshi,D.D.(1987):Linear Estimation and Design of Experiments,Wiley Eastern.
9. Kempthorne O.(1965) : The Design and Analysis of Experiments,Wiley Eastern.

Paper III:
Practical : Practicals Based on Paper I & II

1. drawing random samples from standard univariate discrete and continuous distributions such as Binomial, Poission, Normal, Cauichy and Exponential.
2. Tests of significance based on Student's t, Chi-square, F. Test of significance of sample correlation coefficient. Use of Z Transformation.Testing of equality of means and equality of variance in sampling from bivariate normal.
3. Large sample tests for means and proportions, tests of goodness of fit and independence of attributes in contingency tables.
4. Nonparametric tests: Sign, Run, Median, Wilcoxon, Mann-Whitney tests.
5. Selection of samples and determination of sample size. Simple random sampling, Statified and systematic sampling. Allocation problem in stratified sampling. Ratio and regression methods of estimation.
6. Analysis of variance for one way and two way classifications. Analysis of CRD, RBD and LSD. Analysis of 2^2 and 2^3 experiments.

B.A./B.Sc. –III
Subject: Statistics
Paper-I(Paper Code-0907)
Applied Statistics

Unit I
Indian Applied Statistics System: Present official statistical System in India, Methods of collection of Official Statistics, their reliability and limitations, and the principal publications containing such statistics on the topics-population agriculture, industry, trade, price, labour and employment, transport and communications, Banking and Finance.

Unit II
Demographic Methods: Sources of demographic data: Census, register and-hoc surveys, hospital records, demographic profiles of the Indian Census, Measurement of mortality, and life table,: crude death rate, age specific death rates, infant mortality rates, infant death rate, death rate by cause, standardized death rate, direct & indirect method of standardized death rate, Complete life tables- its main features,mortality rate and probability of dying , uses of survival tables

 Measurement of fertility,: crude birth rate,, general fertility rate, age specific birth rate, total fertility rate, gross reproduction rate, net reproduction rate.

Unit III
Economic Statistics: Index number- definition, application of index numbers. Price relatives and quantity or volume   relatives. Link and chain relatives, problems involved in computation of index numbers, uses of averages, simple aggregative and weighted average methods, Laspeyre's, Paasche's, Marchal-edgeworth's and Fisher's index numbers, Time and Factor reversal tests. Chain base index number, Consumer price –index numbers.

Unit IV
Static laws of demand and supply, Price elasticity of demand, Forms of demand functions, Engel's curves, Income elasticity of demand.
Analysis of income and allied distributions-Pareto distribution, graphical test, fitting of Pareto's Law, log normal distributions and its properties, Lorenz curve and estimation of elasticity from time series data, Gini's coefficient.

Unit V
Time series analysis- economic time series, different   components, illustrations, additive and multiplicative models, determination of trend, growth curves, analysis of seasonal fluctuations, construction of seasonal indices.

REFERENCES
1. Croxton F.E. and Cowden D.J. (1969): Applied General Statistics, Prentice Hall of India.
2.Chatfield, C.(1980): The Analysis of Time Series-An Introduction ,Second Edition Chapman and Hall.

3.Goon A.M.;Gupta,M.K. and Dasgupta ,B(1986):Fundamentals of Statistics, Volume-Two, World Press,Calcutta
4. Guide to Current Indian Official Statistics: Central Statistical Organization, Govt. of India, New Delhi.
5. Mukhopadhyay ,P.(1999) : Applied Statistics, New Central Book agency Pvt. Ltd., Calcutta.
6. Srivastava O.S. (1983): A Text Book of Demography, Vikas Publishing.

ADDITIONAL REFERENCES
1. Cox,P.R.(1970):Demography,Cambridge University Press.
2. Pressat R. (1978): Statistical Demography, Methuen and Co. Ltd.

Paper-II(Paper Code-0908)
Statistical Quality Control and Computational Techniques

Unit I
Importance of statistical methods in industrial research and practice, specification of items and lot qualities corresponding to visual gauging, count and measurements, types of inspection, determination of tolerance limits. General theory of control charts, causes of variation in quality, control limits, sub-grouping, summary of out of control criteria. Charts for attributes, np chart, p-chart, c-chart, u- chart. Charts for variables, $\overline{X}$ and R charts, design of $\overline{X}$ and R charts, versues p chrts, process cabability of studies.

Unit II
Principle of acceptance sampling-problem of lot acceptance, stipulation of good and bad lots, Producer's and consumers risks, single and double sampling plans for all attributes , their OC functions, concepts of AQL, LTPD, AOQL, Average amount of inspection and ASN function, rectifying inspection plans, sampling inspection plans for variables, Indian Standard Tables Part-I(including applications), IS 2500 Part I.

Unit III
Computational Techniques: Difference tables and methods of interpolation : Newton's forward and backward interpolation formula, Lagranges method of interpolation,   divided difference interpolation formula. Numerical differentiation and integration . Trapezoidal, Simpson's one – third formulae, iterative solutions of non-linear equations.

Unit IV
Linear Programming: Elementary theory of convex sets, definition of general linear programming problems (LPP), formulation problems of LPP, examples of LPP. Problems occurring in varios fields, Graphical and Simplex methods of solving an LPP, artificial variables, duality of LPP, Transportation Problem (non-degenarate and balanced cases only), Assignment Problems.

Unit V
 Four short notes, one from each unit will be asked. Students have to answer any two.

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1.Brownless K.A. (1960): Statistical Theory and Methodology in Science and Engineering, John Wiley and Sons.
2.Grant E.L. (1964): Statistical Quality Control, McGraw Hill.
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4. Gauss S.I. (1975) : Linear Programming Methods and Applications, McGraw Hill.
5. Montgomery, D.C. (1985): Introduction to Statistical Quality Control; Wiley.
6. Rajaraman, V. (1981) : Computer Oriented Numerical Methods, Prentice Hall.
7.Shanti Narayan (1993). Mathematical Analysis, S. Chand and Co.

8. Sastry S.S. (1987): Introductory Methods of Numerical Analysis, Prentice Hall
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2. Browker H.A. and Liberman G.T. (1962): Engineering Statistics, Prentece Hall.
3.Despande J.V. (1981). Text Book of Mathematical Analysis, Tata McGraw Hill.

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5. Garwin W.W. (1960): Introduction to Linear Programming, McGraw Hill.
6. Kanti Swarup,Gupta,P.K. and Singh,M.M. (1985):Operations Research;Sultan chand & sons.

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8. Rao S.S. (1984) : Optimization Theory and Applications, Wiley Eastern.
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10.Wagner H.M. (1973) Principle of O.R. with Applications to Managerial Decisions; Prentice Hall.
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Paper III:
Practical : Practicals Based on Paper I & II
1. Computing measures of mortality and fertility, construction of life tables, graduation of mortality rates by Gompertz curve, fitting of Logistic curve.
2. Construction of index numbers by Laspeyre's, Paasche's, Marshell,-Edgeworth and Fisher method.
3. Determination of trend in a time series, construction of seasonal indices.
4. Fitting of Pareto curve to income data, Lorenz curve of concentration, Estimation of price elasticity of demand from time series data.
5. Drawing of $\bar{X}$ -R, np, p anf c –charts. Drawing of OC curve for single and double sampling plans.
6. Construction of difference tables. Use of Newton's, Lgrange's methods of interpolation and divided difference formulae, numerical evaluation of integrals using Trapezoidal and Simpon's one-third formulae, solution to non-linear equation by Newton-Raphson iterative method.
7. Formulation of LPPs and their duals. Solving LPPs by graphical and simplex methods, transportation and assignment problems.