Pt. Ravishankar Shukla University,
Raipur (Chhattisgarh), India 492010

B.Sc. Part-III

Syllabus

Session 2023-24 (Exam 2024)

Note:- बी.एस.सी. भाग–तीन शिक्षा सत्र 2022–23 का पाठ्यक्रम सत्र 2023–24 हेतु यथावत प्रभावशील किया गया है।)

(संशोधित पाठ्यक्रम)

बी.ए./बी.एस–सी./बी.कॉम./बी.एच.एस.–सी.

भाग – तीन, आधार पाठ्यक्रम

प्रश्न पत्र – प्रथम (हिन्दी भाषा)

(पेपर कोड – 0231)

पूर्णांक– 75

इकाई–एक (क) भारत माता : सुमित्रानंदन पंत

(ख) कथन की शैलियाँ

1. विवरणात्मक शैली

2. मूल्यांकन शैली

3. व्याख्यात्मक शैली

4. विचारात्मक शैली

इकाई–दो (क) सूखी डाली : उपेन्द्रनाथ अश्क

(ख) विभिन्न संरचनाएँ

1. विनम्रता सूचक संरचना

2. विधि सूचक संरचना

3. निषेध परक संरचना

4. काल–बोधक संरचना

5. स्थान–बोधक संरचना

6. दिशा बोधक संरचना

7. कार्य–कारण सम्बन्ध संरचना

8. अनुक्रम संरचना

इकाई–तीन (क) वसीयत : मालती जोशी

(ख) कार्यालयीन पत्र और आलेख

1. परिपत्र

2. आदेश

3. अधिसूचना

4. ज्ञापन

5. अनुस्मारक

6. पृष्ठांकन

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

(ख) अनुवाद : स्वरूप एवं परिभाषा, उद्देश्य

स्रोत भाषा और लक्ष्य भाषा,

अच्छे अनुवाद की विशेषताएँ,

अनुवाद प्रकिया, अनुवादक

इकाई—पांच (क) संस्कृति और राष्ट्रीय एकीकरण : योगेश अटल

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

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

पाठ्यकम संशोधन का औचित्य –

निर्धारित पाठ का अध्ययन एवं हिन्दी भाषा प्रयोग की व्यवहारिक प्रणालियों से विधार्थियों को परिचित कराना तथा भाषा प्रयोग की सामान्य अशुद्धियों को दूर करने की दृष्टि से पाठ्यकम तैयार किया गया है। विधार्थियों के लिए पाठ्यकम का विस्तार बहुत ज्यादा न हो इसका ध्यान रखा गया है।

अध्यक्ष– हिंदी अध्ययन मंडल

COMPUTTER SCIENCE

PAPER - I

(Paper Code-0909)

COMPUTER HARDWARE PART-C

AIM : The emphasis is on the design concepts & organisational details of the common PC, leaving the complicated Electronics of the system to the computer engineers.

Objective of the Course :

1. To introduce the overall organisation of the microcomputers and operating systems.

2. To introduce the interaction of common devices used with computers with operating softwares, excluding the Assembly languages, with special reference to DOS/WINDOWS.

3. To introduce the working of hardware components, Micro-Processor and various chips used in micro-computers by operating system, without the use of electronic circuitry.

4. To introduce the use of operating systems architecture with IBM-PC & clones, excluding Assembly language, with forms an important part of hardwares.

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

UNIT-1 : ORGANISATION OF Micro-Processor & MIRCO-COMPUTER :-

1. Introduction & organisation of Micro-Computer :

   (a) Basic Components of Micro-computer : Basic Block; Prom ram memory; Data memory; I/O Ports; Clock generator; Integration of functional blocks.

   (b) Interconnecting Components in a Micro-computer : Necessary functional block; Bussed architecture for microcomputer; memory addressing; Addressing I/O ports; comparision of I/O mapped and memory mapped I/O.

   (c) Input Output Techniques : Non-CPU devices, Program & interrupt controlled I/O; Hardware controlled I/O or DMA.

2. An Introduction to the various as :

   (a) General understanding of different μP or CPU :
   Intel 8088, 286, 386, 486, 586 Pentium, P54C, MMX P55C; Motorola 6800 & 88100 series; CYRIX & AMD CPUs.

   (b) The Registers of CPU : (Give Example of P-8088) Register organisation of 8088, Scrach pad segment, pointer, Index and Flag, Registers.

   (c) Memory addressing modes of P-8088 : Segment offset; Data addressing modes; Addressing for branch instructions.

   (d) I/O Addressing with P-8088 : Memory mapped I/O & I/O mapped I/O.

UNIT-2 : SYSTEM HARDWARE ORGANISATION OF COMPUTERS :

1. Hardware Organisation of the Personal Computer :

   (a) Block diagram with various parts of PC.

   (b) The Mother Board of General P.C. : 8088 CPU; ROM & RAM; Keyboard

& its interface; System timer/counters; Hardware interrupt vectoring; DMA controller & channels; Interfacing to audio speaker; Bus slots & facture cards.

(c) The Serial I/O ports, COM-1 & COM-2.

(d) The parallel Port for Printer.

(e) Expansion Slots for RAM.

(f) Disk Controllers : For floppy, Hard disk, CD-ROM & Cassets drives.

2. The Video Display of PCs :

(a) Video Monitors; Monochrome and colour.

(b) Video Display Adapters & Their Video Modes; Monochrome & colour graphics adapters.

(c) Video Control Through ANSI-SYS.

(d) Video Control Through ROM-BOIS : INT 10H.

(e) Direct Video Control; Monochrom & colour graphics adapters.

(f) Installing Customized Character Sets.

UNIT-3 : ORGANISATION OF OPERTING SYSTEM WITH SYSTEM HARDWARE :

1 The ROM-BIOS Services :

(a) Introduction to UNIX, ENIX, SUN, solaris, DOS & MAC with special reference to DOS & Windows, its ver., as DOS becomes more popular than others in PCs.

(b) The ROM-BIOS Diskette Services, INT 13H.

(c) The ROM-BIOS Serial Port Services, INT 14H.

(d) The ROM-BIOS Keyboard Services, INT 16H.

(e) The ROM-BIOS Printer Services, INT 17H.

(f) Miscellaneous Service Provided by the ROM-BIOS : INT 05H, INT 11H, INT 12H, INT 18H, INT 19H, INT 1AH.

2 The fundamental of Operating System viz. DOS/WINDOWS :

(a) The loading of DOS & Its Basic Structure ; ROM bootstrap, IO.SYS, DOS.SYS & Command..COM.

(b) The Execution of the programs under DOS ; EXEC functions, program segment prefix; Features of COM & EXE program files.

(c) Device Handling by Dos ; FDD, HDD, CON, Keyboard, PRN, AUX, CLOCK and NUL devices; Block devices; Character devices; Driver installation sequence.

(d) File Structures of DOS ;

(e) The DOS Interrupts : INT 20H-2FH

(f) The DOS functions through INT 21H; Discuss only the understanding part of various other DOS function to handle hard & softwares.

(g) Installation of windows : Important system files in windows.

UNIT-4 : ORGANIZATION & HANDLING BY OPERATING SYSTEMS :

1 Disk and Files under DOS :

(a) Logical Structure of a Disk : Organisation of disk for use; Boot record ; FAT

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files; disk or root directory.

(b) File Organisation on a DOS disk : Logical volumes ; Sub directories; Volume lables.

(c) Manipulating Files under DOS : File attributes ; date and time, file Access; FCB functions.

2 **Memory Allocation, Program Loading and Execution :**

(a) Memory Management under DOS : EXEC loader; Memory Management & its functions; Modifying a Program's memory allocation.

(b) Loading and Executing Programs under DOS : The EXEC function ; Memory considerations; parameter blocks; calling & returning from EXEC.

(c) Loading the program overlays through EXEC.

UNIT-5 : ORGANISATION OF HARDWARE BY OPERATING SYSTEM :

1. **Interrupt Handling through DOS :**

(a) Types of interrupts.

(b) Interrupt Vector Table in PC.

(c) Interrupt Service Routines.

(d) Special Interrupts in PC : Clock Interrupt; The -C or Break Interrupt ; DOS reserved interupt INT 28H ; Patching memory resident routines.

2. **Filters for DOS :**

(a) Filters in operating systems.

(b) Redirection of I/O under DOS.

(c) The Filters Supplied with DOS.

(d) Writing Filters to run under DOS.

3. **Handling of Various Versions of Windows O.S. :**

(a) Setup Installation

(b) Trouble shooting

(c) Networking features

Text Book :

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

Supporting Text Books :

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

2 Computer Fundamentals : Architecture & Organisation.
   By B. Ram.. (Wiley Eastern Ltd. New Delhi).

Reference Books :

1. IBM PC-XT and Clones : By Govinda Rajalu.

2 Microprocessor and interfacing : By Douglas Hall.

3. Insight the IBM-PC : Peter Norton.

4. Micriprocessor System : 8086/8088 family architecture, programming & design : By Liu and Gibson.

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(50) (Dr. A. K. Diwive

11-06-18

Hari shankan Prasad Tadel

Pd. Rao)

PAPER - II
(Paper Code-0910)

Aim : To introduce DBMS and RDBMS using Back-end tool and Front-end tool.

Object of the Course :

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

UNIT-1 : CONCEPT OF D.B.M.S. AND DATA MODELS

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

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

UNIT-2. : RELATIONAL DATABASE MANAGEMENT SYSTEM

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

(b) Relational Database Design : Pitfalls in Relational Database Desing, Decomposition Functional Dependencies, Normalization : 1NF, 2NF, BCNF, 3NF, 4NF, 5NF.

UNIT-3 : INTRODUCTION TO RDBMS SOFTWARE - ORACLE

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

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

(c) Security : Management of Roles, Changing Password, Granting Roles & Privilege, with drawing privileges.

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

UNIT-4 : G.U.I. PROGRAMMING

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

(b) Overview of Variables, Declaring, Scope, Arrays, User defined data types, Constants, Working with procedures : Function, Subroutine, and Property.

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11-06-18

Hari shankar Prasad Tarde

(C. K. Gavel)

11/06/18

Anuj 11/6/18

(Dr.A.K.Diwivedi)

11/06.2018

(Dr. Sanjay Kumar)

Working with Data, Time, Format, String, and Math's Function. Controlling Program Execution: Comparison and Logical Operators, If...Then statements, Select Case Statement, Looping Structures, Exiting a loop. Error Trapping and Debugging.

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

UNIT-5 : V DATA BASE PROGRAMMING IN VB

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

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

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

REFERENCE BOOKS :

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

PRACTICALS :

1. **Practicals on Oracle :**
   At least 20 practicals covering the SQL, PL/SQL, Triggers, Views.

2. **Practicals on Visual Basic :**
   At least 20 pracricals on VB that covering basic and data controls components.

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प्रपत्र

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

कमांक	कक्षा का नाम	वर्तमान पाठ्यकम	नवीन संशोधित पाठ्यकम	नवीन संशोधित पाठ्यकम 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	*Sanoo* 11-06-2018
2.	Mr. Hari Shankar Prasad Tonde	Head, Dept. of Computer Science, Sarguja University, Ambikapur	11-06-18
3.	Dr. Anuj Kumar Dwivedi	Head, Dept. of Computer Science, Govt. V.B.S.D. Girls College, Jashpur Nagar, Jashpur	Anuj 11/6/18
4.	Mr. L.K. Gavel	Head, Dept. of Computer Science, Govt. G.S.G. P.G. College Balod	Gavel 11/06/18
5.	Dr. J. Durga Prasad Rao	Head, Dept. of Computer Science, Shri Sankracharya Mahavidyalaya, Bhilai	11/6/18

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. Berkhausan criteria for sustained oscillator. RF oscillators-Hartley oscillatot, Colpetts oscillators (Qualitative study) relaxation osillators, 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 UT (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 microproooessor : 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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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

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. 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	Name of Paper	Max Marks	Total Marks	Min Marks
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	Name of Paper	Max Marks	Total Marks	Min Marks
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. 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.

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
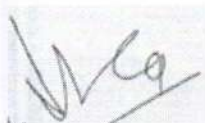
Sharma PD, *Mycology and Phytopathology*, Rastogi Publications, Meerut

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

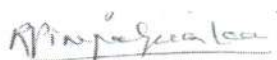Sharma AK, *Text book of Biostatistics,* Discovery Publishing House Pvt. Ltd.

(Dr. J.N. Verma)   (Dr. Rekha Pimpalgaonkar)   (Dr.Ranjana Shristava)

Proff. & Head   Proff. & Head   Proff. & Head

Govt. D.B. Girls PG College   Govt. N PG Science College   Govt. VYTPG Science College

Raipur, (C.G.)   Raipur, (C.G.)   Raipur, (C.G.)

(Mrs. Sanchal Moghe)   (Mr. Shivakant Mishra)   (Mr Sudheer Tiwari)

Govt. Bilasa Girls College, Bilaspur
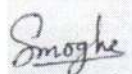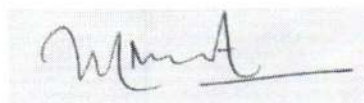
B.Sc.-III (BOTANY) PAPER –II

(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
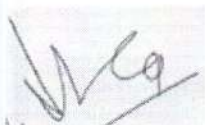
B.Sc.-III (Botany)

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
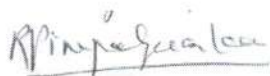
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Govt. Bilasa Girls College, Bilaspur

कक्षा / Class- B.Sc-III

Paper –I

जीवाश्म विज्ञान एवं संस्तर विज्ञान

(Palaeontology & Stratigraphy)

इकाई–01   (1)   जीवाश्म विज्ञानः जीवाश्म, परिभाषा, जीवाश्मन की आवश्यक परिस्थितियाॅ एवं विधियाॅ

(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, संस्तर विज्ञान एवं आर्थिक महत्व।

(2) गोंडवाना महासंघ का संस्तर विज्ञान, पुराजलवायु, भौगोलिक वितरण एवं आर्थिक महत्व।

(3) डेक्कन ट्रेप का संस्तर विज्ञान, भौगोलिक वितरण एवं आयु।

(4) बाघ संस्तर एवं लेमेटा संस्तर का संस्तर विज्ञान, भौगोलिक वितरण एवं जीवाश्म।

(5) साल्ट रेंज क्षेत्रों के पुराजीव समूहों का भौगोलिक वितरण संस्तर विज्ञान एवं जीवाश्मिकी।

इकाई–05 (1) स्पिटी क्षेत्रों के पुराजीव समूहों का भौगोलिक वितरण, संस्तर विज्ञान एवं आर्थिक महत्व।

(2) त्रिचनापल्ली क्षेत्र के क्रिटेशियस शैलों का संस्तर विज्ञान, जीवाश्म एवं आर्थिकी।

(3) कच्छ क्षेत्र के जुरासिक शैलों का संस्तर विज्ञान, जीवाश्म एवं आर्थिकी।

(4) असम के तृतीयक महायुग समूह का भौगोलिक वितरण संस्तर विज्ञान एवं आर्थिकी।

(5) शिवालिक समूह का संस्तर विज्ञान, भौगोलिक वितरण एवं कशेरूकीय जीवाश्मीय तत्व।

प्रायोगिक कार्य:

(1) सैद्धांतिक पाठ्यक्रम के अन्तर्गत उल्लेखित जीवाश्मों की आकारिकी का अध्ययन।

(2) प्रमुख पादप जीवाश्मों का अध्ययन।

(3) भारत के रेखा मानचित्र में विभिन्न संस्तर विज्ञानी इकाईयों को दर्शाना।

(4) भारत के प्रमुख भूआकृतिक एवं शैल विर्वतनिक 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.

Class- B.Sc-III

Paper –I

(Palaeontology & Stratigraphy)

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

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कक्षा / Class- B.Sc-III

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 विधियाँः ड्रीलिंग, प्रतिचयन एवं आमापन।

(3) भूभौतिकीय पूर्वेक्षणतकनीकः 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)

Class- B.Sc-III

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

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(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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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 : ब्रिटिश, 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 – व्यैकित्तत्व 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 चौड़ाई)
5. बाई–इलिहयोक्रिस्टियेल 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 डेक्टिलियॉन तक की ऊँचाई)
10. बॉडी वेट (शारीरिक भार / वजन)

ब. सिर एवं चेहरे की माप

1. मार्फोलॉजिकल 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 test.)

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.

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

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.

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

List of Books-

1. A test Book of Biotechnology: Indu Shekher Thakur, 2nd edition. I.K. International Pvt. Ltd., New Delhi.

2. Biotechnology (Fundamentals and Applications): S.S. Purohit - Agrobios (India), Jodhpur.

3. Fundamentals of Microbiology and Immunology: Ajit Kr. Banerjee, Nirmalya Banerjee -New central Book Agency (P) Ltd., Kolkata.

4. Plant Biotechnology: H.S. Chawla - Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

5. Plant Biotechnology: B.D. Singh - Kalyani Publication, New Delhi.

6. Biotechnology: Fundamental &Application (2005) S.S. Purohit

7. Immunology: J. Kubey et al. 7th edition.

8. Immunology: Roitt et al.

9. Fundamental of Immunology: W. Paul.

10. Plant Tissue culture: K.K.De.

11. Plant Tissue Culture (Practical): H.S. Chawla.

12. Biochemistry & Molecular Biology of Plant: Buchanan, Gruissemen& Jones 2nd edition.

13. Tools and Techniques in Biotechnology (2011) M. Debnath

List of Practical's

PLANT, ENVIRONMENTAL, INDUSTRIAL AND MEDICAL BIOTECHNOLOGY

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

SCHEME FOR PRACTICAL EXAMINATION

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

1. Experiment based on Paper - I

    (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)

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.

PRACTICAL

Max. Marks-50

INORGANIC CHEMISTRY

Gravimetric analysis:

- Estimation of nickel (II) using Dimethylglyoxime (DMG).
- Estimation of copper as CuSCN
- Estimation of iron as Fe_2O_3 by precipitating iron as $Fe(OH)_3$.
- Estimation of Al (III) by precipitating with 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, NaHCO3, 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.

SYLLABUS
GEOGRAPHY
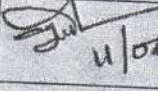# (B.A. / B.Sc.)
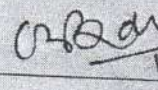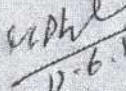# (UG COURSES)

Admitted Batch 2018-19
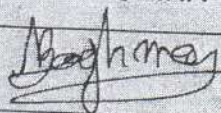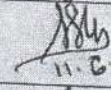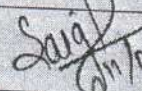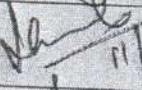
JUNE 2018

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

कमांक	सदस्यों का नाम/पदनाम	हस्ताक्षर
1	डॉ. एन. के. बघमार, प्रोफेसर अध्यक्ष, भूगोल, अध्ययन मण्डल, पं. र. वि. वि. रायपुर	
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, (प्रमोन्नत 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	11/06/2018
6	डॉ. शीला श्रीधर, सहा. प्राध्यापक एवं विभागाध्यक्ष, भूगोल विभाग, शास. दू. ब. महिला. महा. रायपुर	11/06/2018
7	श्री. 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

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.र्वा.न्ह 11:00 बजे केन्द्रीय 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 –

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

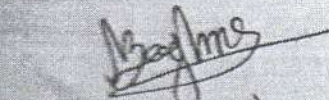Paper-III   Practical Geography

B.A./B.Sc. Part III

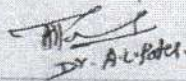The B.A./B.Sc. Part III Examination in Geography will be 150 marks. There will be two theory papers and one Practical each of 50 marks as follows
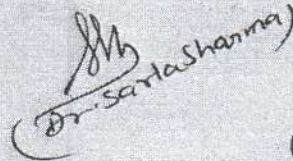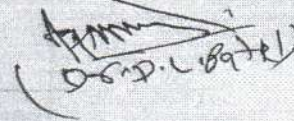
Paper – I   Remote Sensing and GIS
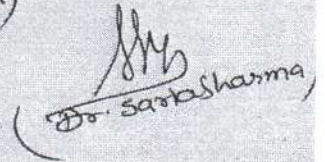
Paper - II   Geography of Chhattisgarh

Paper - III   Practical Geography

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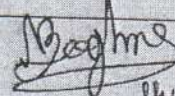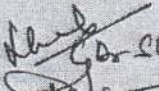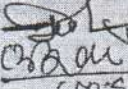
कक्षा : बैचलर ऑफ आर्ट्स/साइंस
विषय : भूगोल
संकाय : कला/विज्ञान

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   :   D. 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 Bastar Vi

5. श्री गोपीश्वर साय, सदस्य   :

6. डॉ. शीला श्रीधर, सदस्य   :   (Dr Sheela Shridhar)

7. डॉ. कृष्ण कुमार द्विवेदी, सदस्य   :   (Dr Dwivedi)

8. श्री एस. एस. साहू, सदस्य   :   (M.S. SAHU) Gov. P.G. college Kurud

9. डॉ सखा राम कुजाम, सदस्य   :

10. डॉ. एन. पी. गुप्ता, आमंत्रित सदस्य   :

कार्य वृत :– आज दिनांक 11/06/2018 को पू वार्न्ह 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
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Paper-II	Regional Geography of India
Paper-III	Practical Geography

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

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

अधिकतम अंक: 50

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

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

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

इकाई –4 : भौगोलिक सूचना प्रणाली का परिचय : भूसूचना की परिभाषा, भूसूचना का महत्व एवं विषय क्षेत्र, भौगोलिक सूचना प्रणाली का इतिहास, जी0 आई0 एस0 की संकल्पना, जी0 आई0 एस0 के कार्य – आंकड़ा प्रवेश, संचालन, परिचालन, प्रबंधन, त्रुटि संसूचन, विश्लेषण एवं प्रदर्शन, धरातलपत्रक, सर्वेक्षण, हवाई बिम्ब, उपग्रह आंकड़े एवं बिम्ब, आंकड़ो 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.

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बी.ए. / बी.एस.सी. तृतीय वर्ष
प्रश्न पत्र–द्वितीय
छत्तीसगढ़ का भूगोल
(पेपर कोड – 0249)

</div>

अधिकतम अंक : 50

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

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

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

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

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

Books Recommended:
1. Jha, Vibhash Kumar and Saumya Naiyyar (2013) Chhattisgarh Samagra, Chhattisgarh Rajya Hindi Granth 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

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

अधिकतम अंक : 50

खण्ड (अ)

मनचित्र पठन एवं निर्वचन
20

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

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

इकाई –3. उपग्रह बिम्ब : प्रारम्भिक सूचनाओं की व्याख्या बिम्ब निर्वचन : 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.

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

PAPER - II
GEOGRAPHY OF CHHATTISGARH
Max. Marks: 50
(Paper Code-0249)

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.

New Proposed Syllabus

For

UNDERGRADUATE PROGRAMME
(B.Sc. PROGRAM in PHYSICS)

B.Sc. Programme in Physics

Course structure

B.Sc. – Part-I

PAPER 1	Mechanics, Oscillations and Properties Of Matter
PAPER 2	Electricity and Magnetism And Electromagnetic Theory

B.Sc. – Part-II

PAPER 1	Thermodynamics, Kinetic Theory And Statistical Physics
PAPER 2	Waves, Acoustics and Optics

B.Sc.– Part-III

PAPER 1	Relativity, Quantum Mechanics, Atomic Molecular and Nuclear Physics
PAPER 2	Solid State Physics, Solid State Device And Electronics

Subject: Physics

Paper-I: RELATIVITY, QUANTUM MECHANICS, ATOMIC MOLECULAR AND NUCLEAR PHYSICS

UNIT	Current Course	New Proposed Course	Justification
I	Reference systems, inertial frames, Galilean invariance and conservation laws, propagation of light, Michelson-Morley experiment, search for ether. Postulates for the special theory of relativity, Lorentz transformations, length contraction, time dilation, velocity addition theorem, variation of mass with velocity, mass-energy equivalence, particle with zero rest mass, Compton effect.	Reference systems, inertial frames, Galilean invariance propagation of light, Michelson-Morley experiment, search for ether. Postulates for the special theory of relativity, Lorentz transformations, length contraction, time dilation, velocity addition, variation of mass with velocity, mass-energy equivalence, particle with zero rest mass.	**No modification**
II	Origin of the quantum theory: Failure of classical physics to explain the phenomena such as black-body spectrum, photoelectric effect. Wave-particle duality and uncertainty principle : de Broglie's hypothesis for matter waves : the concept of wave and group velocities, evidence for diffraction & interference of particles, experimental demonstration of mater waves. Davisson and Germer's experiment. Consequence of de Broglie's concepts, quantisation in hydrogen atom, energies of a particle in a box, wave packets. Consequence of the uncertainty relation: gamma ray microscope, diffraction at a slit.	Origin of the quantum theory : Failure of classical physics to explain the phenomena such as black-body spectrum, photoelectric effect, Compton effect, Wave-particle duality, uncertainty principle, de Broglie's hypothesis for matter waves, the concept of Phase and group velocities, experimental demonstration of mater waves. Davisson and Germer's experiment. Consequence of de Broglie's concepts, **Bohr's complementary Principle, Bohr's correspondence principle, Bohr's atomic model,** energies of a particle in a box, wave packets. Consequence of the uncertainty relation, gamma ray microscope, diffraction at a slit.	**Relevant topic introduced**
III	Quantum Mechanics: Schrodinger's equation. Postulatory basis of quantum mechanics, operators, expectation values, transition probabilities, applications to particle in a one and three dimensional	Quantum Mechanics: Schrodinger's equation. Statistical interpretation of wave function, Orthogonality and normalization of wave function, Probability current density, Postulatory basis of quantum mechanics, operators, expectation values,	**Relevant topic introduced**

	boxes, harmonic oscillator in one dimension, reflection at a step potential, transmission across a potential barrier. Hydrogen atom: natural occurrence of n, l and m quantum numbers, the related physical quantities.	Ehrenfest's theorem, transition probabilities, applications to particle in a one and three dimensional boxes, harmonic oscillator in one dimension, reflection at a step potential, transmission across a potential barrier.	
IV	Spectra of hydrogen, deuteron and alkali atoms spectral terms, doublet fine structure, screening constants for alkali spectra for s,p, d and f states, selection rules. Discrete set of electronic energies of moleculers, quantisation of vibrational and rotational energies, determination of internuclear distance, pure rotational and rotation vibration spectra. Dissociation limit for the ground and other electronic states, transition rules for pure vibration and electronic vibration spectra. Raman effect, Stokes and anti-Stokes lines, complimentary character of Raman and infrared spectra, experimental arrangements for Raman spectroscopy.	Spectra of hydrogen, deuteron and alkali atoms spectral terms, doublet fine structure, screening constants for alkali spectra for s, p, d and f states, selection rules. Discrete set of electronic energies of moleculers, quantisation of vibrational and rotational energies, determination of internuclear distance, pure rotational and rotation vibration spectra. Dissociation limit for the ground and other electronic states, transition rules for pure vibration and electronic vibration spectra. Raman effect, Stokes and anti-Stokes lines, complimentary character of Raman and infrared spectra, experimental arrangements for Raman spectroscopy.	**No modification**
V	Interaction of charged particles and neutrons with mater, working of nuclear detectors, G-M counter, proportional counter and scintillation counter, cloud chambers, spark chamber, emulsions. Structure of nuclei, basic properties (r_1 , μ Q and binding energy), deuteron binding energy, p-p and n-p scattering and general concepts of nuclear forces, Beta decay, range of alpha particle Geiger-Nuttal law. Gamow's explanation of beta decay, alpha decay and continuous and discrete spectra. Nuclear reactions, channels, compound nucleus, direct reaction (concepts). Shell model & liquid drop model, fission and fusion (concepts), energy	Structure of nuclei:- Basic Properties of Nuclei: (1) Mass, (2) Radii, (3) Charge, (4) Angular Momentum, (5) Spin, (5) Magnetic Moment (μ), (6) Stability and (7) Binding Energy, Nuclear Models:- Liquid Drop Model, Mass formula, Shell Model, Types of Nuclear reactions, laws of conservation, Q-value of reactions, Interaction of Energetic particles with matter, Ionization chamber, GM Counter, Cloud Chambers, Fundamental Interactions, Classification of Elementary Particles, Particles and Antiparticles. Baryons, Hyperons, Leptons, and Mesons. Elementary Particle Quantum Numbers : Baryon Number, Lepton Number, Strangeness, Electric Charge, Hypercharge and Isospin, introductory idea of discovery of Higg's Boson.	**Idea of high energy physics is introduced.**

production in stars by p-p and carbon cycles (concepts).		

TEXT AND REFERENCE BOOKS :

1. H.S. Mani and G.K. Metha : "Introduction to Modern Physics"" (Affiliated East-West Press,1989)
2. A Beiser, "Prospective of Modern Physics"
3. H.E. White, Introduction to Atomic Physic"
4. Barrow, "Introduction to Molecular Physics!"
5. R.P. Feynman, R.B. Leighton and M Sands, "The Feynman Lectures on Physics", Vol.III
(B.I. Publications, Bombay, Delhi, Calcutta, Madras).
6. T.A. Littlefield and N Thorley, "Atomic and Nuclear Physics" (Engineering Language BookSociety)
7. H.A. Enge, "Introduction to Nuclear Physics", (Addision-Wesly)
8. Eisenberg and Resnik, "Quantum Physics of Atoms, Molecules, Solids, Nuclei andParticles" (John Wiley)
9. D.P. Khandelwal, "Optics and Atomic Physics", (Himalaya Publishing House, Bombay,1988).
10.Quarks and Leptons, F. Halzen and A.D. Martin, Wiley India, New Delhi, 1984.
11.Radiation detection and measurement, G.F. Knoll (John Wiley & Sons, 2000).
12. Theoretical Nuclear Physics, J.M. Blatt & V.F.Weisskopf (Dover Pub.Inc., 1991).

Subject: Physics

Paper-II: SOLID STATE PHYSICS, SOLID STATE DEVICES AND ELECTRONICS

UNIT	Current Course	New Proposed Course	Justification
I	Amorphous and crystalline solids, Elements of symmetry, seven crystal system, Cubic lattices, Crystal planes, Miller indices, Laue's equation for X-ray diffraction, Bragg's Law. Bonding in solids, classification. Cohesive energy of solid. Madelung constant, evaluation of Parameters. Specific heat of solids, classical theory (Dulong-Petit's law). Einstein and Debye theories. Vibrational modes of one dimensional monoatomic lattice, Dispersion relation, Brillouin Zone.	Amorphous and crystalline solids, Elements of symmetry, seven crystal system, Cubic lattices, Crystal planes, Miller indices, Laue's equation for X-ray diffraction, Bragg's Law, Bonding in solids, classification. Cohesive energy of solid, Madelung constant, evaluation of Parameters, Specific heat of solids, classical theory (Dulong-Petit's law), Einstein and Debye theories, Vibrational modes of one dimensional monoatomic lattice, Dispersion relation, Brillouin Zone.	**No modification**
II	Free electron model of a metal, Solution of one dimensional Schrodiner equation in a constant potential. Density of states. Fermi Energy, Energy bands in a solid (Kronig-Penny model without mathematical details). Metals, Insulator and Semiconductors. Hall effect. Dia, Para and Ferromagnetism. Langevin's theory of dia and para-magnetism. Curie- Weiss's Law. Qualitative description of Ferromagnetism (Magnetic domains), B-H. curve and Hysteresis loss.	Free electron model of a metal, Solution of one dimensional Schrödinger equation in a constant potential, Density of states. Fermi Energy, Energy bands in a solid (Kronig- Penny model without mathematical details), ***Difference between Metals, Insulator and Semiconductors.*** Hall effect. Dia, Para and Ferromagnetism. Langevin's theory of dia and para-magnetism, Curie- Weiss's Law, Qualitative description of Ferromagnetism (Magnetic domains), B-H curve and Hysteresis loss.	**No modification only basic idea about categorization of metal introduced**

III	Intrinsic semiconductors, carrier concentration in thermal equlibrium, Fermi level, Impurity semiconductor, doner and acceptor levels, Diode equation, junctions, junction breakdown, Depletion width and junction capacitance, abrupt junction, Tunnel diode, Zener diode. Light emmitting diode, solar cell, Bipolar transistors, pnp and npn transistors, characteristics of transistors, different configurations, current amplificationfactor, FET.	*Intrinsic and extrinsic semi conductors, Concept of Fermi level, Generation and recombination of electron hole pairs in semiconductors, Mobility of electrons and holes, drift and diffusion currents, p-n junction diode, depletion width and potential barrier, junction capacitance, I-V characteristics,* Tunnel diode, Zener diode, Light emmitting diode, solar cell, Bipolar transistors, pnp and npn transistors, characteristics of transistors, different configurations, current amplification factor, FET and MOSFET Characteristics.	This syllabus is changed in accordance with the syllabus of other universities
IV	Half and full wave rectifier, rectifier efficiency ripple factor, Bridge rectifier, Filters, Inductor filter, L and π filters, Zener diode, regulated power supply. Applications of transistors. Bipolar Transistor as amplifier. Single stage and CE small signal amplifiers, Emitter followers, Transistor as power amplifier, Transistor as oscillator, Wein-Bridge Oscillator and Hartley oscillator.	Half and full wave rectifier, rectifier efficiency ripple factor, Bridge rectifier, Filters, Inductor filter, L and π section filters, Zener diode, regulated power supply using zener diode, Applications of transistors, Bipolar Transistor as amplifier, h-parameter, h-parameter equivalent circuit, Transistor as power amplifier, Transistor as oscillator, principle of an oscillator and Bark Hausen's condition, requirements of an oscillator, Wein-Bridge oscillator and Hartley oscillator.	Introduced h-parameter, h-parameter Equivalent Circuit, are easy way to understand of various amplification circuit.
V	Introduction to computer organisation, time sharing and multi programming systems, window based word processing packages, MS Word. Introduction to C programming and application to simple problems of arranging numbers in ascending / descending orders : sorting a given data in an array, solution of simultaneous equation.	**Digital Circuits: Difference between Analog and Digital Circuits, Binary Numbers, Decimal to Binary and Binary to Decimal Conversion, AND, OR and NOT Gates (Realization using Diodes and Transistor), NAND and NOR Gates as Universal Gates, XOR and XNOR Gate, De Morgan's Theorems, Boolean Laws, Simplification of Logic Circuit using Boolean Algebra, Digital to Analog Converter, Analog to Digital Converter.**	The topic of Computer programming does not match with the title. Digital electronics is introduced in place of computers, as computer is taught as a different stream.

TEXT AND REFERENCE BOOKS :
1. Introduction to solid state physics : C.Kittel
2. Solid State Physics : A.J. Dekkar
3. Electronic Circuits : Mottershead
4. Electronic Circuits : Millman and Halkias

5. Semiconductor Devices : S.M. Sze
6. Electronic devices : T.L. Floyd
7. Device and Circuits : J. Millman and C. Halkias.
8. Electronic Fundamental and Applications: D. Chatopadhyay and P.C. Rakshit.
9. Electricity and Magnetism : K.K. Tiwari.

PHYSICS

OBJECTIVES OF THE COURSE

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

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

EXAMINATION SCHEME:

1. There shall be 2 theory papers of 3 hours duration each and one practical paper of 4 hours duration. Each paper shall carry 50 marks.
2. Numerical problems of at least 30% will compulsorily be asked in each theory paper.
3. In practical paper, each student has to perform two experiments one from each groups as listed in the list of experiments.
4. Practical examination will be of 4 hours duration- one experiment to be completed in 2 hours.

   The distribution practical marks as follows:
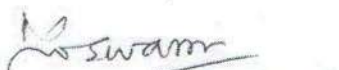
   Experiment   : 15+15=30
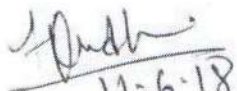   Viva voce   :   10
   Internal assessment :   10

5. The external examiner should ensure that at least 16 experiments are in working order at the time of examination and submit a certificate to this effect.
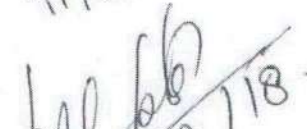
RELATIVITY, QUANTUM MECHANICS, ATOMIC MOLECULAR AND NUCLEAR PHYSICS

Unit-1 Reference systems, inertial frames, Galilean invariance propagation of light, Michelson-Morley experiment, search for ether. Postulates for the special theory of relativity, Lorentz transformations, length contraction, time dilation, velocity addition, variation of mass with velocity, mass-energy equivalence, particle with zero rest mass.

Unit-2 Origin of the quantum theory : Failure of classical physics to explain the phenomena such as black-body spectrum, photoelectric effect, Compton effect, Wave-particle duality, uncertainty principle, de Broglie's hypothesis for matter waves, the concept of Phase and group velocities, experimental demonstration of mater waves. Davisson and Germer's experiment. Consequence of de Broglie's concepts, Bohr's complementary Principle, Bohr's correspondence principle, Bohr's atomic model, energies of a particle in a box, wave packets. Consequence of the uncertainty relation, gamma ray microscope, diffraction at a slit.

Unit-3 Quantum Mechanics: Schrodinger's equation, Statistical interpretation of wave function, Orthogonality and normalization of wave function, Probability current density, Postulatory basis of quantum mechanics, operators, expectation values, Ehrenfest's theorem, transition probabilities, applications to particle in a one and three dimensional boxes, harmonic oscillator in one dimension, reflection at a step potential, transmission across a potential barrier.

Unit-4 Spectra of hydrogen, deuteron and alkali atoms spectral terms, doublet fine structure, screening constants for alkali spectra for s, p, d and f states, selection rules. Discrete set of electronic energies of moleculers, quantisation of vibrational and rotational energies, determination of inter-nuclear distance, pure rotational and rotation vibration spectra. Dissociation limit for the ground and other electronic states, transition rules for pure vibration and electronic vibration spectra. Raman effect, Stokes and anti-Stokes lines, complimentary character of Raman and infrared spectra, experimental arrangements for Raman spectroscopy.

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

TEXT AND REFERENCE BOOKS:

1. H.S. Mani and G.K. Metha: "Introduction to Modern Physics"" (Affiliated East-West Press, 1989).
2. A Beiser, "Prospective of Modern Physics".
3. H.E. White, Introduction to Atomic Physic".
4. Barrow, "Introduction to Molecular Physics".
5. R.P. Feynman, R.B. Leighton and M Sands, "The Feynman Lectures on Physics", Vol.III (B.I. Publications, Bombay, Delhi, Calcutta, Madras).
6. T.A. Littlefield and N Thorley, "Atomic and Nuclear Physics" (Engineering Language Book Society)
7. H.A. Enge, "Introduction to Nuclear Physics", (Addision-Wesly)
8. Eisenberg and Resnick, "Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles" (John Wiley)
9. D.P. Khandelwal, "Optics and Atomic Physics", (Himalaya Publishing House, Bombay, 1988).
10. Quarks and Leptons, F. Halzen and A.D. Martin, Wiley India, New Delhi, 1984.
11. Radiation detection and measurement, G.F. Knoll (John Wiley & Sons, 2000).
12. Theoretical Nuclear Physics, J.M. Blatt & V.F.Weisskopf (Dover Pub.Inc., 1991).

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 वर्षो 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 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.

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.

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.)**

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

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**	50
	Paper-II (Code No. 0804): **Descriptive Statistics I**	50
	Paper III: Practical- Based on Theory Papers I & II	50
	Total	**150**
B.A./B.Sc. II	**Paper-I** (Code No. 0853): **Statistical Methods**	50
	Paper-II (Code No. 0854): **Sampling Theory and Design of Experiments**	50
	Paper III: Practical- Based on Theory Papers I & II	50
	Total	**150**
B.A./B.Sc. III	**Paper I** (Code No. 0907): **Applied Statistics**	50
	Paper II (Code No. 0908): **Statistical Quality Control and Computational Techniques**	50
	Paper III: Practical- Based on Theory Papers I & II	50
	Total	**150**

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.

REFERENCES

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.
3. Ducan A.J. (1974): Quality Control and Industrial Statistics, Traporewala and Sons.
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
9. Taha H.A.(1982) Operational research :An Introduction ;Macmillan

ADDITIONAL REFERENCES:

1. Biswas Suddhendu (1996): Statistics of Quality Control,Sampling Inspection and Reliability,new Age international Publishers,New delhi.
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.

4. Crowden, D.J. (1960): statistical Methods in Quality Control, Asia publishing Society
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.

7. Mahajan M. (2001) Statistical Quality Control, Dhanpat Rai & Co. (P. Ltd.).
8. Rao S.S. (1984) : Optimization Theory and Applications, Wiley Eastern.
9. Somasundaram, D. and Choudhari, B.(1996). A First Course in Mathematical Analysis, Narosa Publishing House.
10. Wagner H.M. (1973) Principle of O.R. with Applications to Managerial Decisions; Prentice Hall.
11. Wetherill ,G.B (1977) Sampling Inspection and Quality Control; Halsted Press.

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.

To   Raipur, dt. June 20th, 2018
Registrar
Pt. Ravishankar Shukla University
Raipur-492 010, C.G.

Subject: Regarding Correction/ Modification/ Upgradation of syllabus of Under Graduate
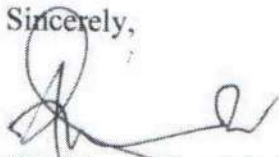Course (Discipline-Chemisty/ Faculty-Science).

Reference: University letter no. 6507/ Acad/ CBS/2018, ,dt. 08-06-2018

Sir/ Madam,

This is in connection to the subject and reference and mentioned as above. As per the directives,
meetings of Central Board of Studies (Chemistry) were held on 11th and 18th instant at School of
Studies in Chemistry for correction/ modification/ upgradation of syllabus at UG level.

Accordingly, hard and soft copies of the newly designed syllabus are being sent for your kind
perusals and for further and necessary action..

Sincerely,

(Dr. Manas Kanti Deb)
Chairman, Central Board of Studies
Professor & Head, School of Studies in Chemistry
Pt. Ravishankar Shukla University, Raipur-492010, C.G.
debmanas@yahoo.com
+919425503750

Enclosures:
1. New Syllabus (one Hard and one Soft copy)
2. Nine leaflets indicating justification for changes incorporated
3. One Register on Minutes of the Meetings conducted
4. Attendance record of the members

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

(Signature of members of Central Board of Studies)

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.

(Signature of members of Central Board of Studies)

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

(Signature of members of Central Board of Studies)

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.

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