



# हेमचंद यादव विश्वविद्यालय, दुर्ग (छ.ग.)

(पूर्व नाम- दुर्ग विश्वविद्यालय, दुर्ग)

रायपुर नाका दुर्ग (छ.ग.)-491001

ई मेल : [academic@durguniversity.ac.in](mailto:academic@durguniversity.ac.in)

वेब साइट : [www.durguniversity.ac.in](http://www.durguniversity.ac.in)

दूरभाष : 0788-2359400

क्र. 3861 / अका. / 2021

दुर्ग, दिनांक 30/7/21

प्रति,

प्राचार्य,

समस्त संबद्ध महाविद्यालय,

हेमचंद यादव विश्वविद्यालय,

दुर्ग (छ.ग.)

विषय:- स्नातक स्तर भाग-तीन के पाठ्यक्रम विषयक।

संदर्भ:- संयुक्त संचालक, उच्च शिक्षा विभाग के पत्र क्र. 2456/315/आउशि/सम/2019, दिनांक 16.05. 2019।

—00—

विषयांतर्गत लेख है कि संदर्भित पत्र के माध्यम से प्राप्त स्नातक स्तर भाग-तीन के निम्नलिखित कक्षा/विषयों के परिवर्तित/संशोधित पाठ्यक्रम शिक्षा सत्र 2021-22 से लागू किये जाते हैं:-

1. बी.ए. — आधार पाठ्यक्रम — हिन्दी भाषा, हिन्दी साहित्य, राजनीतिशास्त्र, अर्थशास्त्र, नृत्य, दर्शनशास्त्र, समाजशास्त्र, इतिहास, मानवविज्ञान, संस्कृत, सांख्यिकी प्राचीन भारतीय इतिहास, भूगोल, मनोविज्ञान
2. बी.एस-सी. — आधार पाठ्यक्रम-हिन्दी भाषा, जीव विज्ञान, मानवविज्ञान, बायोटेक्नोलॉजी, कम्प्यूटर साईंस, गणित, भौतिक शास्त्र, प्राणीशास्त्र, सूक्ष्मजीव विज्ञान, वनस्पतिशास्त्र, भूविज्ञान, इलेक्ट्रॉनिक्स, रसायन शास्त्र, सांख्यिकी, भूगोल।
3. बी.ए./बी.एस.सी. — आधार पाठ्यक्रम — हिन्दी भाषा एवं गृह विज्ञान।  
(गृह विज्ञान)
4. बी.सी.ए. — भाग-3
5. बी.कॉम. — भाग-1, भाग-2 एवं भाग-3 का परिवर्तित पाठ्यक्रम सत्र 2019-20 में जारी कर लागू किया जा चुका है।

कृ.प.उ.

उपरोक्त विषयों को शिक्षा सत्र 2021-22 से संशोधित रूप में स्नातक स्तर भाग-तीन के लिए लागू किया जाता है स्नातक स्तर भाग-एक हेतु सत्र 2019-20 एवं स्नातक स्तर भाग-दो हेतु सत्र 2020-21 में लागू पाठ्यक्रम मान्य होंगे।

टीप:- परिवर्तित/संशोधित पाठ्यक्रम विश्वविद्यालय की वेबसाईट पर उपलब्ध है।

  
कुलसचिव

क्र. 3862 /अका./2021

दुर्ग, दिनांक 30/7/21

प्रतिलिपि:-

1. संयुक्त संचालक, उच्च शिक्षा विभाग के पत्र क्र. 2456/315/आउशि/सम/2019, दिनांक 16.05.2019 के परिपेक्ष्य में सूचनार्थ
2. उपकुलसचिव, परीक्षा विभाग एवं उपकुलसचिव, गोपनीय विभाग हेमचंद यादव विश्वविद्यालय, दुर्ग।
3. वेबसाईट प्रभारी, वेबसाईट पर पाठ्यक्रम प्रकाशित करने हेतु।
4. कुलपति के निज सहायक एवं कुलसचिव के निज सहायक, हेमचंद यादव विश्वविद्यालय, दुर्ग।

  
सहा. कुलसचिव (अका.)

# **HEMCHAND YADAV VISHWAVIDYALAYA, DURG (C.G.)**

Website - [www.durguniversity.ac.in](http://www.durguniversity.ac.in), Email - [durguniversity@gmail.com](mailto:durguniversity@gmail.com)



## **SCHEME OF EXAMINATION & SYLLABUS of**

**B.Sc. Final Year  
Session 2021-22**

**(Approved by Board of Studies)  
Effective from July 2021**

## **REVISED ORDINANCE NO. 21**

### **BACHELOR OF SCIENCE**

1. The three year course has been broken up into three Parts. Part-I known as B.Sc. Part-I examination at the end of the first year, Part-II known as B.Sc. Part-II examination at the end of the second year and Part-III known as B.Sc. Part-III examination at the end of the third year.
2. A candidate who after passing (10+2) Higher Secondary or Intermediate examination of C.G. Board of Secondary Education Bhopal or any other Examination recognised by the University or C.G. Board of Secondary Education as equivalent thereto, has attended a regular course of study in an affiliated College or in the Teaching Department of the University for one academic year shall be eligible for appearing at the B.Sc. Part-I examination.
3. A candidate who, after passing the B.Sc.-I examination of the University or any other examination recognised by the University as equivalent thereto, has attended a regular course of study for one academic year in an affiliated college or in the Teaching Department of the University shall be eligible for appearing at the B.Sc. Part-II examination.
4. A candidate who, after passing the B.Sc. Part-I examination of the University, has completed a regular course of study for one academic year in an affiliated college or in the Teaching Department of the University shall be eligible for appearing at the B.Sc. Part-III examination.
5. Besides regular students, subject to their compliance with this Ordinance ex-student and non-collegiate candidates shall be permitted to offer only such subjects/papers as are taught to the regular student at any of the University Teaching Department or College.
6. Every candidate appearing in B.Sc. Part-I, Part-II and Part-III examination shall be examined in-
  - (i) Foundation Course:
  - (ii) Any one of the following combinations of three subjects:-
    1. Physics, Chemistry & Mathematics.
    2. Chemistry, Botany & Zoology.
    3. Chemistry, Physics & Geology.
    4. Chemistry, Botany & Geology.
    5. Chemistry, Zoology & Geology.
    6. Geology, Physics & Mathematics.
    7. Chemistry, Mathematics & Geology.
    8. Chemistry, Botany & Defence Studies.
    9. Chemistry, Zoology & Defence Studies.
    10. Physics, Mathematics & Defence Studies.
    11. Chemistry, Geology & Defence Studies.
    12. Physics, Mathematics & Statistics.
    13. Physics, Chemistry & Statistics.
    14. Chemistry, Mathematics & Statistics.
    15. Chemistry, Zoology & Anthropology.
    16. Chemistry, Botany & Anthropology.
    17. Chemistry, Geology & Anthropology.
    18. Chemistry, Mathematics & Statistics.

19. Chemistry, Anthropology & Defence Studies.
20. Geology, Mathematics & Statistics.
21. Mathematics, Defence Studies & Statistics
22. Anthropology, Mathematics & Statistics
23. Chemistry, Anthropology & Applied Statistics
24. Zoology, Botany & Anthropology
25. Physics, Mathematics & Electronics.
26. Physics, Mathematics & Computer Application
27. Chemistry, Mathematics & Computer Application
28. Chemistry, Bio-Chemistry & Pharmacy
29. Chemistry, Zoology & Fisheries.
30. Chemistry, Zoology & Agriculture
31. Chemistry, Zoology & Sericulture
32. Chemistry, Botany & Environmental Biology
33. Chemistry, Botany & Microbiology
34. Chemistry, Zoology & Microbiology
35. Chemistry, Industrial Chemistry & Mathematics
36. Chemistry, Industrial Chemistry & Zoology
37. Chemistry, Biochemistry, Botany
38. Chemistry, Biochemistry, Zoology
39. Chemistry, Biochemistry, Microbiology
40. Chemistry, Biotechnology, Botany
41. Chemistry, Biotechnology, Zoology
42. Geology, Chemistry & Geography
43. Geology, Mathematics & Geography
44. Mathematics, Physics & Geography
45. Chemistry, Botany & Geography

(iii) Practical in case prescribed for core subjects.

7. Any candidate who has passed the B.Sc. examination of the University shall be allowed to present himself for examination in any of the additional subjects prescribed for the B.Sc. examination and not taken by him at the degree examination. Such candidate will have to first appear and pass the B.Sc. Part-I examination in the subjects which he proposes to offer and then the B.Sc. Part-II and Part-III examination in the same subject. Successful candidates will be given a certificate to that effect.
8. In order to pass at any part of the three year degree course examination an examinee must obtain not less than 33% of the total marks in each subject/ group of subjects. In subject/ group of subjects where both theory and practical examination are provided an examinee must pass in both theory and practical parts of the examination separately.
9. Candidate will have to pass separately at the Part-I, Part-II and Part-III examinations. No division shall be assigned on the result of the Part-I and Part-II examination. In determining the division of the final examination, total marks obtained by the examinees in their Part-I, Part-II and Part-III examination in the aggregate shall be taken in to account. Provided in case of candidate who has passed the examination through supplementary examination having failed in one subject/ group only, the total aggregate marks being carried over for determining the division shall include actual marks obtained in the subject/ group in which he appeared at the supplementary examination.
10. Successful examinee at the Part-III examination obtaining 60% or more marks shall be placed in the First Division, those obtaining less than 60% but not less than 45% marks in the Second Division and other successful examinees in the Third Division.

बी.ए./बी.एस-सी./बी.कॉम./बी.एच.एस.-सी.  
भाग - तीन, आधार पाठ्यक्रम  
प्रश्न पत्र - प्रथम (हिन्दी भाषा)

पूर्णांक- 75

- इकाई-एक (क) भारत माता : सुमित्रानंदन पंत  
(ख) कथन की शैलियाँ  
1. विवरणात्मक शैली 2. मूल्यांकन शैली  
3. व्याख्यात्मक शैली 4. विचारात्मक शैली
- इकाई-दो (क) सूखी डाली : उपेन्द्रनाथ अशक  
(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 प्रक्रिया, 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 आंतरित विकल्प होगा। प्रत्येक प्रश्न के 15 अंक होंगे। इसलिए प्रत्येक प्रश्न के दो भाग 'क' और 'ख' होंगे एवं अंक क्रमशः 8 एवं 7 अंक होंगे। प्रश्नपत्र का पूर्णांक 75 निर्धारित है।

5/7/2021

डा. आशा तिवारी

5/7/2021

Archana Dha  
डा. आशा तिवारी

The question paper for B.A./B.Sc./B.Com./B.H.Sc. III Foundation course, English Language and General Answers shall comprise the following items :

Five question to be attempted, each carrying 3 marks.

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

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

Books Prescribed:

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

**HEMCHAND YADAV VISHWAVIDYALAYA, DURG (C.G.)**  
**NEW CURRICULUM OF B.Sc. PART III**  
**SESSION 2021-22**  
**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.  $\pi$ -acceptor behavior of CO (MO diagram of CO to be discussed), Zeise's salt: Preparation and structure.

*Alkha Tejasani*  
28.06.21  
(Dr. Alkha Tejasani)

*Dr. C. Bose*  
28.06.2021  
(Dr. C. Bose)

*Dr. Rajmani Patel*  
28.06.2021  
(Dr. Rajmani Patel)

*28.6.2021*

*Jaagrit Kumar*  
28.06.2021  
Jaagrit Kumar

## 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  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$ , nitrogen fixation.

## UNIT-V

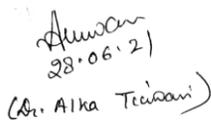
**HARD AND SOFT ACIDS AND BASES (HSAB)** Classification of acids and bases as hard and soft. Pearson's HSAB concept, acid-base strength and hardness and softness. Symbiosis, Applications of HSAB principle.

### INORGANIC POLYMERS

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

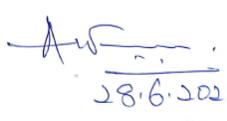
## REFERENCE BOOKS

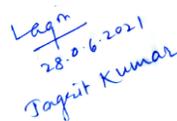
1. Basic Inorganic Chemistry, F. A. Cotton, G. Wilkinson and P. L. Gaus, Wiley.
2. Concise Inorganic Chemistry, J. D. Lee, ELBS.
3. Concepts of Models of Inorganic Chemistry, B. Douglas, D. Mc Daniel and J. Alexander, John Wiley.
4. Inorganic Chemistry, D. E. Shriver, P. W. Atkins and C. H. Langford, 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.

  
28.06.21  
(Dr. Anika Tejasani)

  
28.06.2021  
(Dr. C. Bose)

  
28.06.2021  
(Dr. Rajmani Patel)

  
28.6.2021

  
28.06.2021  
Jagjit Kumar

**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. Robinson 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.

*Answer*  
28.06.21  
(Dr. Alka Tejasani)

*Bose*  
28.06.2021  
(Dr. C. Bose)

*Rajmani*  
28.06.2021  
(Dr. Rajmani Patel)

*Answer*  
28.6.2021

*Legn*  
28.06.2021  
Jagjit Kumar

## UNIT-IV

### SYNTHETIC POLYMERS

- A.** Addition or chain growth polymerization, Free radical vinyl polymerization, Ziegler-Natta polymerization, Condensation or Step growth polymerization, polyesters, polyamides, phenols- formaldehyde resins, urea-formaldehyde resins, epoxy resins and polyurethanes, natural and synthetic rubbers.
- B. SYNTHETIC DYES**  
Colour and constitution (Electronic Concept). Classification of Dyes. Chemistry of dyes. Chemistry and synthesis of Methyl Orange, Congo Red, Malachite Green, Crystal Violet, phenolphthalein, fluorescein, Alizarine and Indigo.

## UNIT-V

- A. INFRA-RED SPECTROSCOPY**  
Basic principle, IR absorption Band their position and intensity, IR spectra of organic compounds.
- B. UV-VISIBLE SPECTROSCOPY**  
Beer Lambert's law, effect of Conjugation, Types of electronic transitions  $\lambda_{max}$ , Chromophores and Auxochromes, 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.  $^{13}\text{C}$ MR 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.

*Ashwini*  
28.06.21  
(Dr. Aika Tejasani)

*Bose*  
28.06.2021  
(Dr. C. Bose)

*Rajmani*  
28.06.2021  
(Dr. Rajmani Patel)

*Ashwini*  
28.06.2021

*Lagan*  
28.06.2021  
Jagrit Kumar

## 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  $\psi$  &  $\psi^2$ , application of Schrodinger wave equation to particle in a one dimensional box, hydrogen atom (separation into three equations) radial and angular wave functions.

## UNIT-II

### A. QUANTUM MECHANICS-II

Quantum Mechanical approach of Molecular orbital theory, basic ideas-criteria for forming M.O. and A.O., LCAO approximation, formation of  $H_2^+$  ion, calculation of energy levels from wave functions, bonding and antibonding wave functions, Concept of  $\sigma$ ,  $\sigma^*$ ,  $\pi$ ,  $\pi^*$  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.

*Alkha Tejasani*  
28.06.21  
(Dr. Alkha Tejasani)

*Dr. C. Bose*  
28.06.2021  
(Dr. C. Bose)

*Dr. Rajmani Patel*  
28.06.2021  
(Dr. Rajmani Patel)

*28.6.2021*

*Jaagrit Kumar*  
28.06.2021  
Jaagrit Kumar

## UNIT-IV

### ELECTROCHEMISTRY-I

- A. Electrolytic conductance: Specific and equivalent conductance, measurement of equivalent conductance, effect of dilution on conductance, Kohlrausch law, application of Kohlrausch law in determination of dissociation constant of weak electrolyte, solubility of sparingly soluble electrolyte, absolute velocity of ions, ionic product of water, conductometric titrations.
- B. Theories of strong electrolyte: limitations of Ostwald's dilution law, weak and strong electrolytes, Elementary ideas of Debye – Huckel - Onsager's equation for strong electrolytes, relaxation and electrophoretic effects.
- C. Migration of ions: Transport number, Determination by Hittorf method and moving boundary method, ionic strength.

## UNIT-V

### ELECTROCHEMISTRY-II

- A. Electrochemical cell and Galvanic cells – reversible and irreversible cells, conventional representation of electrochemical cells, EMF of the cell and effect of temperature on EMF of the cell, Nernst equation Calculation of  $\Delta G$ ,  $\Delta H$  and  $\Delta S$  for cell reactions.
- B. Single electrode potential : standard hydrogen electrode, calomel electrode, quinhydrone electrode, redox electrodes, electrochemical series
- C. Concentration cell with and without transport, liquid - junction potential, application of concentration cells in determining of valency of ions, solubility product and activity coefficient
- D. Corrosion-types, theories and prevention

### REFERENCE BOOKS

1. Physical chemistry, G.M.Barrow. International Student Edition McGraw Hill.
2. University General Chemistry, CNR Rao, Macmillan.
3. Physical Chemistry R.A.Alberty, Wiley Eastn.
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.

*Alkha Tejasani*  
28.06.21

*Dr. C. Bose*  
28.06.2021

*Dr. Rajmani Patel*  
28.06.2021

*28.6.2021*

*Jagrit Kumar*  
28.06.2021

Ambar  
28.06.21  
(Dr. Alka Tejasani)

Bose  
28.06.2021  
(Dr. C. Bose)

Rajmani  
28.06.2021  
(Dr. Rajmani Patel)

Arjun  
28.6.2021

Lagn  
28.06.2021  
Jaagrit Kumar

## B.Sc. Part- III

### PRACTICAL

Max. Marks-50

#### INORGANIC CHEMISTRY

Gravimetric analysis:

- Estimation of nickel (II) using Dimethylglyoxime (DMG).
- Estimation of copper as  $\text{CuSCN}$
- Estimation of iron as  $\text{Fe}_2\text{O}_3$  by precipitating iron as  $\text{Fe}(\text{OH})_3$ .
- Estimation of Al (III) by precipitating with oxine and weighing as  $\text{Al}(\text{oxine})_3$  (aluminium oxinate).
- Estimation of Barium as  $\text{BaSO}_4$

Inorganic Preparations:

- Tetraamminecopper (II) sulphate,  $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4 \cdot \text{H}_2\text{O}$
- Cis and trans  $\text{K}[\text{Cr}(\text{C}_2\text{O}_4)_2 \cdot (\text{H}_2\text{O})_2]$  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 ( $\beta$ -naphthol, vanillin, salicylic acid)
- Benzoylation of one of the following amines (aniline, o-, m-, p- toluidines and o-, m-, panisidine) and one of the following phenols ( $\beta$ -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.
- Benzylisothiuronium 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.

*Alka Tejasani*  
28.06.21  
(Dr. Alka Tejasani)

*Dr. C. Bose*  
28.06.2021  
(Dr. C. Bose)

*Dr. Rajmani Patel*  
28.06.2021  
(Dr. Rajmani Patel)

*Dr. Anil Kumar*  
28.6.2021

*Dr. Jagrit Kumar*  
28.06.2021  
(Dr. Jagrit Kumar)

- 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,  $\text{NaHCO}_3$ ,  $\text{NaOH}$  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

*Answer*  
28.06.21  
(Dr. Alka Tejasani)

*Bose*  
28.06.2021  
(Dr. C. Bose)

*Rajmani*  
28.06.2021  
(Dr. Rajmani Patel)

*Answer*  
28.6.2021

*Legn*  
28.06.2021  
Jagrit Kumar

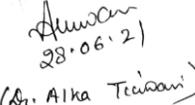
## UV/ Visible spectroscopy

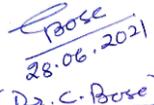
- Verify Lambert-Beer's law and determine the concentration of  $\text{CuSO}_4/\text{KMnO}_4/\text{K}_2\text{Cr}_2\text{O}_7$  in a solution of unknown concentration
- Determine the concentrations of  $\text{KMnO}_4$  and  $\text{K}_2\text{Cr}_2\text{O}_7$  in a mixture.
- Study the kinetics of iodination of propanone in acidic medium.
- Determine the amount of iron present in a sample using 1,10-phenanthroline.
- Determine the dissociation constant of an indicator (phenolphthalein).
- Study the kinetics of interaction of crystal violet/ phenolphthalein with sodium hydroxide.
- Study of pH-dependence of the UV-Vis spectrum (200-500 nm) of potassium dichromate.
- Spectral characteristics study (UV) of given compounds (acetone, acetaldehyde, acetic acid, etc.) in water.
- Absorption spectra of  $\text{KMnO}_4$  and  $\text{K}_2\text{Cr}_2\text{O}_7$  (in 0.1 M  $\text{H}_2\text{SO}_4$ ) and determine  $\lambda_{\text{max}}$  values.

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

## REFERENCE BOOKS:

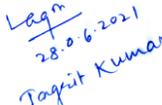
1. Vogel, A.I. Quantitative Organic Analysis, Part 3, Pearson (2012).31
2. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
3. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)
4. Ahluwalia, V.K. & Aggarwal, 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.

  
28.06.21  
(Dr. Aika Tejasani)

  
28.06.2021  
(Dr. C. Bose)

  
28.06.2021  
(Dr. Rajmani Patel)

  
28.6.2021

  
28.06.2021  
Jagrit Kumar

8 Hrs.

PRACTICAL EXAMINATION

M.M.50

Five experiments are to be performed.

1. **Inorganic** - Two experiments to be performed.

- Gravimetric estimation compulsory **08 marks.** (Manipulation 3 marks)
- Anyone experiment from synthesis and analysis **04 marks.**

2. **Organic** - Two experiments to be performed.

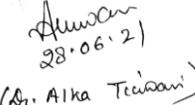
- Qualitative analysis of organic mixture containing two solid components.  
Compulsory carrying **08 marks** (03 marks for each compound and two marks for Separation).
- One experiment from synthesis of organic compound (Single step)  
**04 marks.**

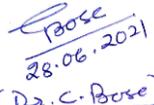
3. Physical-One physical experiment **12 marks.**

4. Sessional **04 marks.**

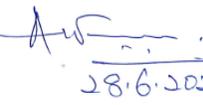
5. Viva Voce **10 marks.**

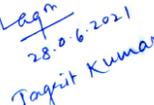
In case of Ex-Students one mark each will be added to Gravimetric analysis and Qualitative analysis of organic mixture and two marks in Physical experiment.

  
28.06.21  
(Dr. Aika Tejasani)

  
28.06.2021  
(Dr. C. Bose)

  
28.06.2021  
(Dr. Rajmani Patel)

  
28.6.2021

  
28.06.2021  
Jagrit Kumar

## Session 2021-22

# 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.

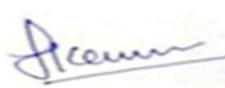
### EXAMINATION SCHEME:

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.

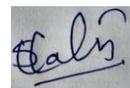
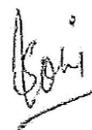
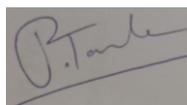
The distribution practical marks as follows:

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.



DUKHU RAM SAHU



## B.Sc. Part-III

### Paper-I

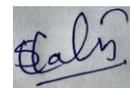
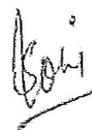
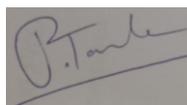
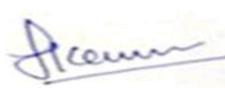
## RELATIVITY, QUANTUM MECHANICS, ATOMIC MOLECULAR AND NUCLEAR PHYSICS

**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.

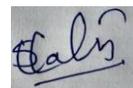
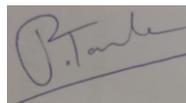
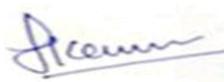
**Unit-4** Spectra of hydrogen, deuteron and alkali atoms spectral terms, doublet fine structure, screening constants for alkali spectra for s, p, d and f states, selection rules. Discrete set of electronic energies of moleculers, quantisation of vibrational and rotational energies, determination of 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, (6) Magnetic Moment ( $\mu$ ), (7) Stability and (8) 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.

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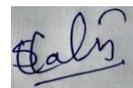
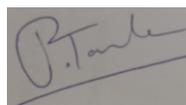
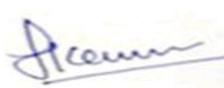
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2. A Beiser, "Prospective of Modern Physics".
3. H.E. White, "Introduction to Atomic Physics".
4. Barrow, "Introduction to Molecular Physics".
5. R.P. Feynman, R.B. Leighton and M Sands, "The Feynman Lectures on Physics", Vol.III (B.I. Publications, 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).
13. Electronic Devices & Circuits By Milliman Helkiyan.



## Paper-II

### SOLID STATE PHYSICS, SOLID STATE DEVICES AND ELECTRONICS

- Unit-1** 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.
- Unit-2** 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.
- Unit-3** Intrinsic and extrinsic semiconductors, 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 emitting diode, solar cell, Bipolar transistors, pnp and npn transistors, characteristics of transistors, different configurations, current amplification factor, FET and MOSFET Characteristics.
- Unit-4** Half and full wave rectifier, rectifier efficiency ripple factor, Bridge rectifier, Filters, Inductor filter, L and  $\pi$  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 Barkhausen's condition, requirements of an oscillator, Wein-Bridge oscillator and Hartley oscillator.
- Unit-5** 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.



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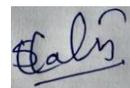
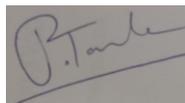
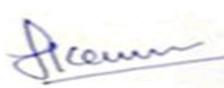
1. Introduction to solid state physics: C. Kittel.
2. Solid State Physics: A.J. Dekkar.
3. Electronic Circuits: Mottershead.
4. Electronic Circuits: Millman and Halkias.
5. Semiconductor Devices: S.M. Sze.
6. Electronic devices: T.L. Floyd.
7. Device and Circuits: J. Millman and C. Halkias.
8. Electronic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

## PRACTICALS

### Minimum 16 (Eight from each group)

#### Experiments out of the following or similar experiments of equal standard

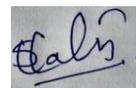
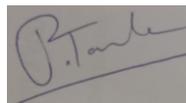
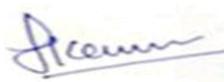
1. Determination of Planck's constant.
2. Determination of  $e/m$  by using Thomson tube.
3. Determination of  $e$  by Millikan's methods.
4. Study of spectra of hydrogen and deuterium (Rydberg constant and ratio of masses of electron proton).
5. Absorption spectrum of iodine vapour.
6. Study of alkali or alkaline earth spectra using a concave grating.
7. Study of Zeeman effect for determination of a Lande g-factor.
8. Analysis of a given band spectrum.
9. Study of Raman spectrum using laser as an excitation source.
10. Study of absorption of alpha and beta rays.
11. Study of statistics in radioactive measurement.
12. Coniometric study of crystal faces.
13. Determination of dielectric constant.
14. Hysteresis curve of transformer core.
15. Hall-probe method for measurement of magnetic field.
16. Specific resistance and energy gap of semiconductor.
17. Characteristics of transistor.
18. Characteristics of tunnel diode.
19. Study of voltage regulation system.
20. Study of regulated power supply.
21. Study of lissajous figures using CRO.
22. Study of VTVM.
23. Study of RC and TC coupled amplifiers.
24. Study of AF and RF oscillators.
25. Find roots of  $f(x) = 0$  by using Newton-Raphson Method.



26. Find root of  $f(x) = 0$  by using secant method.
27. Integration by Simpson rule.
28. To find the value of V at
29. String manipulations.
30. Towers of Hanoi (Non-recursive).
31. Finding first four perfect numbers.
32. Quadratic interpolation using Newton's forward-difference formula of degree two.

**TEXT AND REFERENCE BOOKS:**

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



# MATHEMATICS

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

## **B.A./B.SC. Part-III**

### **PAPER - I ANALYSIS**

#### **METRIC SPACES**

**UNIT-I** 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-II** 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.

#### **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.

#### **REAL ANALYSIS**

**UNIT-IV** 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-V** Riemann integral. Integrability 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.

#### **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 Course 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, New York, 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.

*Pratima*

*Shanti*  
Dr. Shabnam Khan.

*N.S.*  
Neelam Sharma

*TR*  
(Dr. Rakesh Tiwari)

*Asha*  
(Dr. Asha Rani Das)

*Dr. Rani*  
05-7-2019

# B.A./B.SC. Part-III

## PART - II ABSTRACT ALGEBRA

- UNIT-I** Group- Automorphisms, inner automorphism. Automorphism of groups and their computations, Conjugacy relation, Normaliser, Counting principle and the class equation of a finite group. Center for Group of prime-order, Abelianizing of a group and its universal property. Sylow's theorems, Sylow subgroup, Structure theorem for finite Abelian groups.
- UNIT-II** Ring theory-Ring homomorphism. Ideals and quotient rings. Field of quotients of an integral domain, Euclidean rings, polynomial rings, Polynomials over the rational field. The Eisenstein criterion, polynomial rings over commutative rings, Unique factorization domain. R unique factorisation domain implies so is  $R[x_1, x_2, \dots, x_n]$ . 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<sup>nd</sup> 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, Narosa 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.

*Pachmaroli*

*Shabnam Khan*

*Neelesh Sharma*

*Dr. Rakesh Tiwari*

*Dr. Asha Rani Das*

*Dr. Rakesh Tiwari*

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

#### REFERENCES :

1. J. Glen Brookshear, Computer Science : An Overview, Addition -Wesley.
2. Stanley B. Lippman, Josee Lojoie, C++ Primer (3rd Edition), Addison-Wesley.

*Pachmarali*

*Shabnam Khan*

*Neelesh Sharma*

*Dr. Rakesh Tiwari*

*Dr. Asha Rani Das*

*Dr. Rakesh Tiwari*

**B.A./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. Propositional  
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

*Pachmarali*

*Shabnam Khan*

*Neelesh Sharma*

*Dr. Raksh Tiwari*

*Dr. Asha Rani Das*

*Dr. Rani Verma*  
05-7-2019

**B.A./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. Puppeting 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. Hutheison and 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.

*Prabharshi*

*Shabnam Khan*

*Neesam Shaam*

*Dr. Rakesh Tiwari*

*Dr. Asha Rani Das*

*Dr. Rakesh Tiwari*

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:

$$1 + x + \frac{1}{2!}x^2 + \frac{1}{3!}x^3 + \dots + \frac{1}{n!}x^n$$

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.

*Pachmaroli*

*Shabnam Khan*

*N. Sharm*  
Neesha Sharm

*TR mi*  
(Dr. Rakesh Tiwari)

*Asha Rani Das*  
(Dr. Asha Rani Das)

*Dr. Rani Das*  
05-7-2019

## **B.SC.-III**

### **PAPER- I (BOTANY)**

#### **(ANALYTICAL TECHNOLOGY PLANT PATHOLOGY, EXPERIMENTAL EMBRYOLOGY, ELEMENTARY BIOSTATISTICS, ENVIRONMENTAL POLLUTION AND CONSERVATION)**

##### **UNIT-I**

Structure, Principle and applications of analytical instrumentation.

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

##### **UNIT-II**

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

Analytical techniques: Microscopy-Light microscope, Electron microscope

##### **UNIT-III**

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

Rust diseases of wheat, Tikka diseases of ground nut, Red rot of sugar can, Bacterial blight of rice, yellow vein mosaic of b hindi, Little Leaf of brinjal.

##### **UNIT-IV**

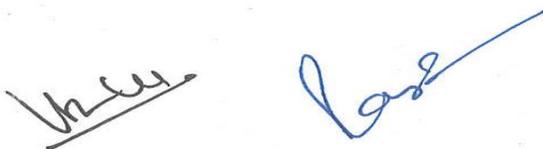
Introduction to pollution, green house gases, Ozone depletion, Dissolve oxygen, B.O.D., C.O.D.

Bio magnification, Eutrophication, Acid precipitation, Pytoremediation. 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 Publications, Meerut

Bhojwani, SS and Razdan, MK, **Plant Tissue Culture: Theory and Practices**, Elsevier

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



**B.SC.-III**  
**PAPER- II (BOTANY)**  
**(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 Polsaccharides

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

**UNIT- V**

ENZYMES: Nomenclature and classifaction, components of enzymes, 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**

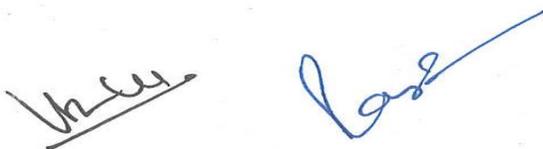
1. Study of host parasite relationship pf plant diseases listed above.
2. Demonstration of preparation of Czapek's Dox medium and potato dextrose agar medium, sterilization of culture medium and pouring.
3. Inoculation in culture tubes and petriplates.
4. Gram Staining.
5. Microscopic examination of 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
7. Viva-Voce	05
8. Sessional	05



# Hemchand Yadav Vishwavidyala, Durg (C.G.)

## Zoology

B.Sc. Part III (2021-22)

### Paper-I

#### ECOLOGY, ENVIRONMENTAL BIOLOGY: TOXICOLOGY, MICROBIOLOGY AND MEDICAL ZOOLOGY

##### Unit: I (Ecology)

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

##### Unit: II (Environmental Biology)

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

##### Unit: III (Toxicology)

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

##### Unit: IV (Microbiology)

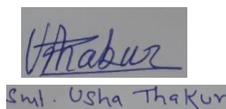
- General and applied microbiology
- Microbiology of domestic water and sewage
- Microbiology of milk & milk products
- Industrial microbiology: fermentation process, production of penicillin, alcoholic beverages, bioleaching.

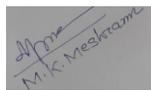
##### Unit: V (Medical Zoology)

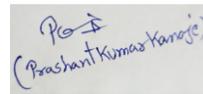
- Brief introduction to pathogenic microorganisms, Rickettsia, Spirochaetes, AIDS and Typhoid
- Brief account of life history & pathogenicity of the following pathogens with reference to man: prophylaxis & treatment
- Pathogenic protozoan's- Entamoeba, Trypanosome & Plasmodium
- Pathogenic helminthes- Schistosoma
- Nematode pathogenic parasites of man
- Vector insects

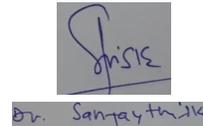
  
Dr. Anil Kumar

  
Dr. Nisreen Kumari

  
Smt. Usha Thakur

  
M.K. Mesaram

  
Prashant Kumar Kanje

  
Dr. Sanjay Thakur

**Zoology**  
**B.Sc. Part III (2021-22)**  
**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; Cose-cycle
- Lipid metabolism- Oxidation of glycerol; Oxidation of fatty acids
- Protein Catabolism- Deamination, transamination, transmethylation

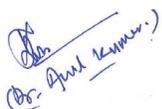
**Unit: IV (Biotechnology)**

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

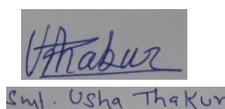
**Unit: V (Biotechniques)**

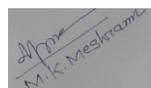
1. Principles & techniques about the following:

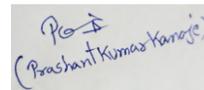
- (i) pH meter
- (ii) Colorimeter
- (iii) Microscopy- Light microscopes: Compound, Phase contrast & Electron microscopes
- (iv) Centrifuge
- (v) Separation of biomolecules by chromatography & electrophoresis

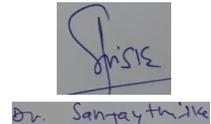
  
Dr. Anil Kumar

  
Dr. Nisreen Khatun

  
Smt. Usha Thakur

  
M.K. Mesaram

  
Prashant Kumar Kanje

  
Dr. Sanjay Thakur

## B. Sc. Part III (2021-22)

### Zoology Practical

The practical work in general shall be based on syllabus prescribed in theory.

The candidates will be required to show knowledge of the following:

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

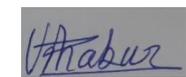
#### Scheme of marks distribution

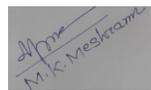
Time: 3:30hrs

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

  
Dr. Anil Kumar

  
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M.K. Mesaram

  
Prashant Kumar Kanjre

  
Dr. Sanjay Thakur

# MICROBIOLOGY

BSc-3<sup>rd</sup>

## 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

*R. Patel*

*DR. K.K. Patel  
29/05/2022*

*Phalg  
15*

## PRACTICAL

M. M. 50

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

### Scheme of practical examination

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

*R. K. K. Patel*

*DR. K. K. Patel*  
29/05/2022

*Phalg*  
15

**HEMCHAND YADAV VISHWAVIDYALAYA, DURG (C.G.)**  
**Scheme of Examination**

कक्षा	प्रश्नपत्र	विषय समूह	सैद्धा. अंक	प्रायो. अंक	योग
BSc. I year	I	भूगतिकी एवं भू-आकृति विज्ञान (Geodynamics & Geomorphology)	50	50	150
	II	खनिज एवं क्रिस्टल विज्ञान (Mineralogy & Crystallography)	50		
BSc. II year	I	शैलिकी (Petrology)	50	50	150
	II	संरचनात्मक भूविज्ञान (Structural Geology)	50		
BSc. III year	I	जीवाश्म विज्ञान एवं संस्तर विज्ञान (Palaeontology & Stratigraphy)	50	50	150
	II	भूसंसाधन एवं व्यावहारिक भूविज्ञान (Earth Resources & Applied Geology)	50		

-: Note :-

प्रत्येक वर्ष के विद्यार्थियों हेतु पाठ्यक्रम में उल्लेखित भूवैज्ञानिक क्षेत्रीय अध्ययन अनिवार्य होगा।



जीवाश्म विज्ञान एवं संस्तर विज्ञान  
(Palaeontology & Stratigraphy)

- इकाई-01
- (1) जीवाश्म विज्ञान: जीवाश्म, परिभाषा, जीवाश्मन की आवश्यक परिस्थितियाँ एवं विधियाँ
  - (2) जीवाश्मों के उपयोग, सूचक-जीवाश्म एवं उनका महत्व
  - (3) संस्तर विज्ञान, पुरापरिस्थितिकी 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) सिफेलोपोडा जीवाश्मों की आकारिकी एवं भूवैज्ञानिक वितरण।
  - (4) इकाइनोडर्मेटा 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 लमेटा संस्तर का संस्तर विज्ञान, भौगोलिक वितरण एवं जीवाश्म।
  - (5) साल्ट रेंज शैल समूहों के पुराजीव समूहों का भौगोलिक वितरण संस्तर विज्ञान एवं जीवाश्मिकी।

*Schmitt*

*Abhinav*

- इकाई—05
- (1) स्पिटी क्षेत्रों के पुराजीव समूहों का भौगोलिक वितरण, संस्तर विज्ञान एवं आर्थिक महत्व।
  - (2) तिरुचिरापल्ली 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 कशेरुकीय 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।
- (5) भूवैज्ञानिक क्षेत्रीय अध्ययन (सात दिवसीय)



Class- B.Sc. - III  
Paper –I  
(Palaeontology & Stratigraphy)

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- Unit-1**
- (1) Palaeontology: Fossils- definition, Essentials for fossilization, modes 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 & its 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 of Cephalopoda.
  - (4) Morphology & geological distribution of Echinoidea & Brachiopoda fossils.
  - (5) Morphology & geological distribution of Trilobite and Graptolite fossils.
- Unit-3**
- (1) Principles of stratigraphy: Geological time scale.
  - (2) Basic concept of lithostratigraphic, chronostratigraphic & biostratigraphic units.
  - (3) Structural & physical subdivision and characteristic features of Indian subcontinent.
  - (4) Distribution, classification & economic importance of 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 Vindhyan & Chhattisgarh supergroup of rocks.
  - (2) Stratigraphy, Palaeoclimate, Geographical distribution & economic aspects of Gondwana Supergroup.



- (3) Stratigraphy, Distribution & age of Deccan Traps.
- (4) Stratigraphy, Distribution & fossil contents of Bagh & Lameta Bed.
- (5) Distribution, Stratigraphy & Palaeontology of Salt Range group of rocks.

#### Unit-5

- (1) Distribution, Stratigraphy & Economic importance of Palaeozoic rocks of Spiti Valley.
- (2) Stratigraphy, Distribution, Fossil content of Cretaceous rocks of Tiruchirapalli.
- (3) Stratigraphy, Distribution, Fossil content & Economic importance of Jurassic rocks of Kutch-Region.
- (4) Distribution, Stratigraphy, Economic importance of Tertiary rocks of Assam-Region.
- (5) Distribution, Stratigraphy & Vertebrate Palaeontological importance of Siwalik group of rocks.

#### Practicals:-

- (1) Study of morphology of fossils belonging to various phyla mentioned in theory curriculum.
- (2) Study of Important plant fossils.
- (3) Representation of Litho-units & Stratigraphic Units in outline map of India.
- (4) Sketching of physiographic and tectonic divisions of India.
- (5) Geological excursion for seven days.

#### Suggested Readings

- (1) जीवाश्म विज्ञान के सिद्धांत— डॉ.अंबिका प्रसाद अग्रवाल
- (2) जीवाश्म विज्ञान— डॉ. आर.पी. मिश्रा
- (3) अकशेरुकी एवं कशेरुकीय 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.C. 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.

- 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 मैग्नीय 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 मूलभूत तथ्य। पीट, लिग्नाइट, बिटूमिनस, एंथ्रासाइट कोल, भारतीय कोल निक्षेप: विशेष संदर्भ में छत्तीसगढ़।
  - (3) प्राकृतिक हाइड्रोकार्बन की उत्पत्ति, स्थानांतरण एवं संचयन। आयल ट्रेप के प्रकार: संरचनात्मक, संस्तर विज्ञानी एवं मिश्रित। भारत के तटीय एवं अपतटीय पेट्रोलियम निक्षेप।
  - (4) रेडियोधर्मी खनिज: खनिजविज्ञान, भूरसायन, पूर्वक्षण तकनीकी, भारत में रेडियोधर्मी खनिजों का भौगोलिक एवं भूवैज्ञानिक वितरण।
  - (5) खनिज आर्थिकी के सिद्धान्त, राष्ट्रीय खनिज नीति।



- 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 इमेजरी 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 अन्वेषण का परिचय। खनिज अन्वेषण की सतही एवं अधोसतही विधियाँ।
  - (2) आर्थिक खनिजों के लिये पूर्वक्षण विधियाँ : ड्रीलिंग, प्रतिचयन एवं आमापन।
  - (3) भूभौतिकीय पूर्वक्षण तकनीक: गुरुत्वीय, विद्युतीय एवं चुम्बकीय विधियाँ।
  - (4) हवाई पूर्वक्षण विधि एवं भूकम्पीय विधियाँ।
  - (5) खनिज स्त्रोंतों के अत्याधिक दोहन के पर्यावरणीय प्रभाव।

#### प्रयोगिक कार्य:

- (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 कार्य: निक्षेप आकलन, टनेज फेक्टर आकलन, ड्रीलिंग आदि से अभ्यास।
- (5) स्टिरियोस्कोप के द्वारा ऐरियल छायाचित्र का अध्ययन एवं विवेचना।
- (6) उपग्रह इमेजरी का अध्ययन एवं विवेचना।
- (7) शैलों के भौमजलीय गुणों का अध्ययन, भौमजलीय मानचित्रों का बनाना एवं अध्ययन
- (8) दस दिवसीय भूवैज्ञानिक क्षेत्रीय अध्ययन



Class- B. Sc. -III  
Paper –II  
(Earth Resources & Applied Geology)

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- Unit-1**
- (i) Economic Geology introduction & 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 products & Residual deposits. Oxidation & supergene sulphide enrichment processes.
  - (ii) Sedimentary processes of ore formation. Placer deposits.
- Unit-2**
- Geological, Geographical distribution, mode of occurrence, mineralogy & economic importance of following metallic & nonmetallic deposits of India.
- (i) Iron, Manganese, Chromium
  - (ii) Copper, Lead, Zinc
  - (iii) Gold, Aluminum
  - (iv) Refractory and Fertilizer minerals
  - (v) Minerals used in cement & chemical industries.
- Unit-3**
- (i) Coal deposits: Origin, Definition & stratigraphy
  - (ii) Fundamentals of coal petrography. Peat, Lignite, Bituminous & Anthracite. Indian coal deposits with special reference to Coal deposits of Chhattisgarh.
  - (iii) Origin of Natural-hydrocarbons, migration & accumulation. Types of oil traps; Structural, stratigraphic and composite. Offshore & Onshore oil deposits of India.
  - (iv) Radioactive minerals: Mineralogy, Geochemistry, Prospecting techniques, Geological & Geographical distribution of atomic-minerals.
  - (v) Principles of mineral economics. National mineral policy.
- Unit-4**
- (i) Engineering Geology & its importance, engineering properties of rocks
  - (ii) Geological conditions for construction of large Dams and Tunnels.
  - (iii) Elementary study of Aerial photographs & satellite imageries. Application of remote sensing techniques 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) Prospecting methods; Drilling, Sampling & Assaying.
- (iii) Geophysical prospecting techniques: Gravity, Electrical & Magnetic methods.
- (iv) Aerial and seismic prospecting methods.
- (v) Environmental impact of over exploitation of mineral resources.

#### **Practical-**

- (1) Study of important metallic and nonmetallic minerals on the basis of physical & optical properties.
- (2) Distribution of important metallic and nonmetallic deposits within outline map of India.
- (3) Magascopic studies of coal & its varieties.
- (4) Exercises related to mineral exploration; Reserve calculation, Tonnage factor calculation, Exercises related to drilling.
- (5) Study of Aerial photographs with the help of stereoscope.
- (6) Study of satellite imageries.
- (7) Study of hydrologic properties of rocks, Preparation of hydrogeological maps.
- (8) Geological excursion for ten days.

#### **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) Principles of Engineering Geology & Geo techniques- Krynine & Judd.
- (11) Groundwater Hydrology- D.K. Todd
- (12) Courses in Mining Geology- R.N.P. Arogyaswami
- (13) Principles & Applications 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)

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Two handwritten signatures in blue ink are located at the bottom of the page. The signature on the left is written in a cursive style and appears to be 'S. K. Valdiya'. The signature on the right is also in cursive and appears to be 'K. S. Valdiya'. Both signatures are underlined.

**HEMCHAND YADAV VISHWA VIDYALAYA, DURG (C.G.)**  
**Syllabus for B.A. / B.Sc. Course, 2021-22**  
**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

	<b>Title of the paper</b>	<b>MAX. Marks</b>
<b>B.A./B.Sc. I</b>	<b>Paper-I</b> (Code No. 0803): <b>Probability I</b>	50
	<b>Paper-II</b> (Code No. 0804): <b>Descriptive Statistics I</b>	50
	<b>Paper III: Practical-</b> Based on Theory Papers I & II	50
	<b>Total</b>	<b>150</b>
<b>B.A./B.Sc. II</b>	<b>Paper-I</b> (Code No. 0853): <b>Statistical Methods</b>	50
	<b>Paper-II</b> (Code No. 0854): <b>Sampling Theory and Design of Experiments</b>	50
	<b>Paper III: Practical-</b> Based on Theory Papers I & II	50
	<b>Total</b>	<b>150</b>
<b>B.A./B.Sc. III</b>	<b>Paper I</b> (Code No. 0907): <b>Applied Statistics</b>	50
	<b>Paper II</b> (Code No. 0908): <b>Statistical Quality Control and Computational Techniques</b>	50
	<b>Paper III: Practical-</b> Based on Theory Papers I & II	50
	<b>Total</b>	<b>150</b>

**B.A./B.Sc. –III**  
**Subject: Statistics**  
**Paper-I**  
**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**

### **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,  $\bar{X}$  and R charts, design of  $\bar{X}$  and R charts, versus p charts, process capability of studies.

#### **Unit II**

Principle of acceptance sampling-problem of lot acceptance, stipulation of good and bad lots, Producer's and consumer's 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, Lagrange's 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 various fields, Graphical and Simplex methods of solving an LPP, artificial variables, duality of LPP, Transportation Problem (non-degenerate 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. Duncan 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, Prentice Hall.
3. Deshpande 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 : Practical 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, Marshall-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 and c -charts. Drawing of OC curve for single and double sampling plans.
6. Construction of difference tables. Use of Newton's, Lagrange's methods of interpolation and divided difference formulae, numerical evaluation of integrals using Trapezoidal and Simpson'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.

## DEFENCE STUDIES

### PAPER-I

#### PROBLEMS OF WAR AND PEACE (Paper Code-0921)

**Aim :** The objective of this paper is to acquaint the students about the multidimensional problems of war and peace and humanitarian laws.

**Note :** Question will be set from each unit, there will be only internal choice.

#### Unit-I U.N.O. AND WORLD PEACE

1. Organs and its role.
2. Main specialized agencies of U.N.O.
3. Role of U.N.O. in world peace.
4. Peace keeping forces of the U.N.O.
5. Veto power and Security Council.

#### Unit-II WAR AND PEACE

1. Settlement of International Disputes.
2. Diplomatic agents and Consuls.
3. War Crimes.
4. Neutrality.
5. Intervention.

#### Unit-III HUMANITARIAN LAW

1. Basic concepts and development of Humanitarian law.
2. UN General Assembly declaration of human rights on Dec. 10, 1948.
3. Protection of Victims and defenceless in armed conflict, POWs, wounded and civilians in Armed Forces.
4. Central Human Right Commission : Organisation and Function.
5. State Human Right Commission : Organisation and Function.

#### Unit-IV REFUGEE LAW

1. Meaning, Concept and causes of Refugee.
2. Refugee and IDPs.
3. Refugee law in India.
4. Refugee Problem in South Asia.
5. Role of International Committee of Red Cross and UNO in Refugee Problems.

#### Unit-V LAWS OF WAR

1. Law of Land war.
2. Law of Sea war.
3. Law of Air war.
4. Space law.
5. The International Court of Justice.

#### SELECTED READINGS :

1. Maunce clark, J : Readings in the Economics of War.
2. International Security : Modern political Science series.
3. Rajani Kothari : Word order.
4. Openhem, I : Use of Forces by states and International law.

**PAPER - II**  
**MODERN WARFARE**  
**(Paper Code-922)**

**Aim :** To enable students to appreciate the impact of Political, economic and technological developments on the patterns of conflicts between nations.

**Note :** Question will be set from each unit, there will be only internal choice.

**UNIT-I** 1. Development of Nuclear weapons.

2. Effects of Nuclear Explosion.
3. Spread of Nuclear Weapons.
4. Missile and their characteristics.
5. Type of Missiles.

**UNIT-II** 1. Trends in Science and Technology and their impact on war.

2. Role of Research and Development.
3. Development of Weapons and their impact on tactics
4. Command, Control, Communication and Intelligence (C<sup>3</sup>I) in Modern Warfare.
5. Elements of National Power.

**UNIT-III** 1. Military Satellites.

2. Explosive Bombs.
3. War Gases.
4. Micro Organs : as a weapons.
5. Smart Weapons.

**UNIT-IV** 1. Rocket Technology and India.

2. Missile Technology and India.
3. Nuclear Technology and India.
4. Atomic Minerals and India.
5. Space Technology and India.

**UNIT-V** 1. New world order - Political, Social and Economical.

2. Alliance and Regional co-operation.
3. Mobilisation of resources for war.
4. War time economics.
5. New trends.

**SELECTED READINGS :**

1. Halailan Morton : Coutemporary Military strategy
2. Brodue, Y. : Strategy in the Missile Age.
3. Markabi, Y. : Nuclear war and Nuclear peace
4. Osanka. F.M. : Modern Guerilla warfare
5. Gerald. J. : Defence Psychology
6. Know Kalus : Science and Defence
7. Pandey Girishkant : Yudh mein vigyan aven Tachniki.

## **PRACTICALS**

**50 marks**

There shall be practical examination of 3.5 hours duration carrying.

The division of marks shall be as follows :

- |                                      |             |
|--------------------------------------|-------------|
| (1) Plain Table Survey               | : 15 Marks. |
| (2) Experimental Military Psychology | : 15 Marks. |
| (3) Group Discussion & Lectring      | : 05 Marks. |
| (4) Viva-Voce                        | : 05 Marks  |
| (5) Sessional work & Record          | : 10 Marks. |

### **Section - A**

Plain table Survey by inters section methods. (Atleast ten exercises in a session).

### **Section - B**

Military - Psychology Experiment :

- (1) Muller-Layer-Illusion test.
- (2) Koh's Block Design Test.
- (3) Allexander Pass Along Test.

### **Section - C**

Group Discussion and Lectures based on current topic on any international & national Problems.

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## INDUSTRIAL CHEMISTRY

### PAPER - I

(Paper Code-0925)

#### CHEMICAL PROCESS ECONOMICS

M.M. 34

- UNIT-I** 1. Factors involved in project cost estimation, methods employed for the estimation of capital investment. 06L  
2. Capital formation, elements of cost accounting. 05L
- UNIT-II** 1. Interest & investment cost, time value of money equivalence. 03L  
2. Depreciation, method of determining depreciation, taxes. 04L  
3. Some aspects of marketing, pricing policy. 04L
- UNIT-III** 1. Profitability criteria, economics of selecting alternatives. 03L  
2. Variation of costs with capacity, Break-even point, optimum batch sizes, Production, scheduling etc. 05L  
3. Sampling of Bulk materials, techniques of sampling of solids, liquids and gasses.  
4. Collection & Processing data. 02L  
5. Particle size determination. 02L  
6. Rheological properties of liquids, plastics and their analysis. 03L

#### INDUSTRIAL ORGANIZATION

- UNIT-IV** 1. Concept of scientific management in industry. 04L  
2. Functions of management, decision making, planning, organising. directing & control. 09L  
3. Location of industry. 03L
- UNIT-V** 1. Materials management. 05L  
2. Inventory control. 04L  
3. Management of human resources-selection, incentives, welfare & safety. 05L

#### BOOKS :

1. Economics of Chemical industry, Hempel, E.H.
2. Plant Design & Economics for Chemical Engineers, Peter Time Rhaus, McGraw Hill.
3. I.C.M.A. Booklets-9 & 10.
4. Industrial Organization & Management, Bethel, L.L.
5. Industrial Organization & Management, Tarachand, Vol. I & II.
6. Book on Management, O.P. Khandelwal.
7. Rheology theory & application, Vol. 5, Elrich, R.F.

**PAPER - II**  
**(Paper Code-0926)**  
**PHARMACEUTICALS**

**M.M. 33**

- UNIT-I**
1. Historical Background & development of pharmaceutical industry in India in brief. 02L
  2. Pharmacopoeias - Development of Indian pharmacopoeia & introduction of B.P., U.S.P., E.P., N.F. & other Important Pharmacopoeias. 02L
  3. Introduction to various types of formulations & routes of administration. 02L
  4. Aseptic conditions, need for sterilisation, various methods of sterilisation. 02L
- UNIT-II**
1. Various types of pharmaceutical excipients their chemistry, process of manufacture & quality, specifications Glidants, lubricants, diluants, preservatives, antioxidants, emulsifying agents, coating agents, binders, coloring agents, flavouring agents gelatin & other additives, sorbitol, mannitol, viscosity builders etc. 12L
  2. Surgical dressing, sutures, ligatures with respect to the process, equipments used for manufacture, method of sterilization and quality control. 05L
- UNIT-III**
1. Pharmaceutical packaging introduction, package selection, packaging materials, ancillary materials, packaging machinery, quality control of packaging materials. 05L
  2. F.D.A., Important schedules & some legal aspects of drugs. 03L
  3. Pharmaceutical quality control (other than the analytical methods covered under core-subject) - sterility testing, pyrogenic testing, glass testing, bulk density of powders, etc. 06L
- UNIT-IV**
1. Evaluation of crude drugs-Moisture content, extractive value, volatile oil content, foreign organic matter, quantitative microscopic exercises, including starch, leaf content, (palisade ratio, stomatal number & index vein, islet termination number), crude fiber content, introduction to chromatographic method of identification of crude drugs. 06L
  2. Chromatography, Paper chromatography, TLC, HPLC, GLC. 04L
  3. Ion chromatography. 01L
- INSTRUMENTATION**
- UNIT-V**
1. UV-Visible spectroscopy. 03L
  2. IR-Spectroscopy non-dispersive IR. 03L
  3. NMR Spectroscopy. 03L
  4. Atomic Absorption & Flame photometry. 03L
  5. Neutron diffraction. 01L
  6. X-Ray Fluorescence. 01L
  7. Ion Selective Electrodes. 01L

**BOOKS :**

1. Instrumental methods of analysis, Willard, Merit, Dean.
2. Introduction to instrumental methods of analysis, Braun, R.D., McGraw Hill.
3. Analytical chemistry, J.B. Dick, McGraw Hill.
4. Quantitative Inorganic analysis, A. Vogel.
5. Instrumental methods of Analysis, Skoog & West.
6. Instrumental Methods of Analysis, B.K. Sharma.

**PAPER -III****(Paper Code-0927)****D R U G S****M.M. 33**

- UNIT-I**
1. Phyto-chemicals-Introduction to plant classification & crude drugs, cultivation, collection, preparations for the market & storage of medicinal plants.
  2. Classification of various types of drugs with examples.
  3. Raw materials, process of manufacture, effluent handling, etc. of the following bulk drugs :-
    - (i) Sulpha drugs-sulphaguanidine, sulphamethoxazole.
- UNIT-II**
1. Chemical constitution of plants including carbohydrates, amino acids, proteins, fats, waxes, volatile oils, terpenoids, steroids, saponins flavonoids, tanins, glycosides, alkaloids.
  2. Various isolation procedures for active ingredients with examples for alkaloids, reserpine one for steroids sapogenin, diosgenin, diogron.
- UNIT-III**
1. Antimicrobial :- Chloramphenicol, Furazolidne, Mercurochrome, Isoniazid, Na-PAS.
  2. Analgesic-AntiInflammatory :- Salicylic acid and its derivatives, Ibuprofen, Mefenamic acid.
  3. Steroidal Harmones :- Progesterone, Testosterone, Methyl testosterone.
- UNIT-IV**
1. Vitamins :- Vit.-A, Vit.-B6, Vit.-C.
  2. Barbiturates :- Pentobarbital.
  3. Blockers :- Propranolol, Atenolol.
  4. Cardiovascular Agent :- Methyl dopa.
  5. Antihistamins :- Chloropheneramine Maleate.
- UNIT-V**
1. Products based of fermentation processes :- Brief idea of micro-organisma, their structure, growth & usefulness. Enzyme systems useful for transformation, microbial products.
  2. General principles of fermentation processes & product processing.
  3. Manufacture of antibiotics - Pencillin-G & semi synthetic pencillines, Rifamycin, Vitamin-B12.
  4. Bio-transformation process for prednisolone, 11-hydroxylation in steroids.
  5. Enzyme catalysed transformation, manufacture of ephidrine.

## BOOKS :-

1. Practical Pharmacognosy, T.B. Willis.
2. Practical Pharmacognosy, T.N. Vasudevan.
3. Modern Pharmacognosy, Remstad, McGraw Hill.
4. Indian Pharmacopoea, 1985.
5. British Pharmacopoea, 1990.
6. Hand Book of Drugs & Cosmetic Act, Mehrotra.
7. Pharmaceutical excipients.
8. Pharmaceutical Dosage forms.
9. Principles of Medicinal Chemistry, W.O. Foye, Lea & Febigen, Publication Philadelphia.
10. Text Book of Organic Medicinal & Pharmaceutical Chemistry, Willson, Gisvold, Derge; Lippinett-Toppan.
11. Essentials of Medicinal Chemistry, Korolkovas & Burkhatler, Wiely Interscience.

## PRACTICAL

**Marks : 50**

The Practical examination will be of 08 Hrs. Duration spread over two days carrying 50 Marks.

Two experiments have to be performed.

1. Synthesis of common industrial compounds involving two step reactions. 4-Bromoaniline, 3-Nitroaniline, Sulphanilamide, 4-Aminobenzoic acid, 4-Nitrobenzoic acid, dihalobenzenes, Nitrohalobenzenes.
2. Industrial analysis of common raw materials as per industrial specification :- Phenol, Aniline, Formaldehyde, Hydrogen peroxide, Acetone, Epoxide, Olefins, Oils etc.
3. Demonstration of various pharmaceutical packaging materials, quality control tests of some materials, -Al Strips, Cartons, Glass bottles.
4. Limit tests for chlorine, heavy metals, arsenic, etc. of two representative bulk drugs.
5. Demonstration of various pharmaceutical products.
6. Active Ingredient analysis of few types of formulations representing different methods of analysis-acidimetry, alkalimetry, non-aqueous.
7. Determination of sulphate ash, loss on drying & other tests of bulk drugs, complete I.P. monograph of three drugs representing variety of testing methods.
8. Evaluation of crude drugs-macroscopic examination-determination & identification of starch granules, calcium oxalate.
9. Palisade ratio, stomatal index-determination & Identification of few drugs. TLC method for identification.
10. Microbiological testing-determination of MIC of some antibacterial drugs by zone/cup plate method.

## DISTRIBUTION OF MARKS :

1. Experiment No. 1.	20
2. Experiment No. 2.	10
3. Viva	05
4. Sessional	05
5. Project Work	10
<b>Total</b>	<b>50</b>

**B.Sc.-III**  
**COMPUTER SCIENCE**  
**PAPER - I**  
**COMPUTER HARDWARE PART-C**

**AIM:** The emphasis is on the design concepts & organizational 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 organization of the microcomputers and operating systems.
2. To introduce the interaction of common devices used with computers with operating software, 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 hardware.

**N.B.:** Since the computer organization 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 & MICRO-COMPUTER:-**

**1 Introduction & organization 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; comparison of I/O mapped and memory mapped I/O.
- (c) Input Output Techniques: Non-CPU devices, Program & interrupt controlled I/O; Hardware controlled I/O or DMA.

**2 An Introduction to the various as:**

- (a) General understanding of different P 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 organization of 8088, Search 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 Organization 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 & factory cards.

*M. S. M. 3/6/21*     *Jan 03/06/2021*     *H. S. 27/6/2021*

- (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 : Organization of disk for use; Boot record ; FAT files; disk or root directory.
- (b) File Organization on a DOS disk : Logical volumes ; Sub directories; Volume labels.
- (c) Manipulating Files under DOS : File attributes ; date and time, file Access; FCB functions.

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

- (a) Memory Management under DOS : EXEC loader; Memory Management & its functions; Modifying a Program's memory allocation.
- (b) Loading and Executing Programs under DOS : The EXEC function ; Memory considerations; parameter blocks; calling & returning from EXEC.
- (c) Loading the program overlays through EXEC.

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## **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 interrupt INT 28H ; Patching memory resident routines.

### **2 Filters for DOS :**

- (a) Filters in operating systems.
- (b) Redirection of I/O under DOS.
- (c) The Filters Supplied with DOS.
- (d) Writing Filters to run under DOS.

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

- (a) Setup Installation
- (b) Trouble shooting
- (c) Networking features **Text Book :**

1. Hardware and Software of Personal Computers.

By Sanjay K. Bose. (Wiley Eastern Ltd. New Delhi).

### **SUPPORTING TEXT BOOKS :**

- 1. Digital System from Gates to Microprocessor.  
By Sanjay K. Bose. (Wiley Eastern Ltd. New Delhi).
- 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. Microprocessor System : 8086/8088 family architecture, programming & design: By Liu and Gibson.

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**B.Sc.-III**  
**PAPER - II**

**Atm :** 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 Constraint, 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**

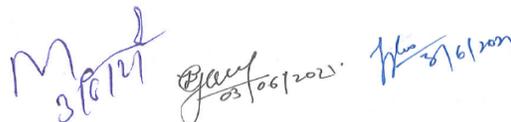
- (a) Relational Model: Structure of Relational Database, Relational Algebra, Domain Relational Calculus, Extended Relational- Algebra Operation, Modification of database, Views.
- (b) Relational Database Design: Pitfalls in Relational Database Design, Decomposition Functional Dependencies, Normalization: 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.
- (c) 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.
- (d) File Organization: Saving data to file, Sequential and Random access file, the design and coding.

  
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## 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 practicals on VB that covering basic and data controls components.

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# INFORMATION TECHNOLOGIES

## PAPER - I AMPLIFIERS AND OSCILLATORS

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

**UNIT-II FEEDBACK AMPLIFIERS AND OSCILLATORS :** Feedback in amplifiers, types of feedback positive, and negative feedback. Derivation of input and output impedance voltage and current series feedback. Advantages of negative feedback, positive feedback, Barkhausen criteria for sustained oscillators. RF oscillators-Hartley oscillator, Colpitts oscillators (Qualitative Study) relaxation oscillators, Multivibrator 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 drift, input offset, common mode rejection ratio, slow rate universal biasing technique. Application of OP-Amp, as inverting non-inverting amplifiers, differentiation, Integrator, signal chopper and voltage follower, silicon controlled rectifier (SCR), Diac, Triac, and UJT (Only qualitative study)

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

**UNIT-V PROGRAMMING THE MICROPROCESSOR :** Machine and assembly language simplified instruction set, instruction set, arithmetic operation, instructions set logical operations, instruction set data transfer operations, instruction set branch operations, instruction set-subroutine all the return operations, instruction set miscellaneous operations, writing a program, addressing mode, program branching, program looping using subroutines. Programming the 8080/8085 microprocessor: Introduction straight line programs looping programs, mathematical programs.

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**B.Sc.-III**  
**INFORMATION TECHNOLOGIES**  
**PAPER – II**  
**FUNDAMENTAL DATA STRUCTURE**

**UNIT – I Introduction to data structure:** The concept of data structure, Abstract data structure, Analyses 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 Stack & Queues as a Circular linked list Application of linked list.

**UNIT – III Tree:** Basic Terminology, Binary Trees, Tree Representation as Array & Linked list, Binary tree representation , Traversal of binary trees : In order Preorder & post order.

Application of Binary trees , Threaded binary trees , B - Trees & Heights balanced tree , representation of B + & B\* trees , Binary trees representation of trees , Counting binary trees 2 -3 Tree 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 & Graphics:** 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 Trees , The basic, Greedy Strategy for computing Algorithm of kruskal and Primes

**TEXT & REFERENCE BOOK**

Fundamental of Data structure	:	by S. Sawhney & Horowith.
Data Structure	:	By Trembly & Sorrenson
Data Structure Using Pascal	:	By Tannenbaun & Alugenntein
Data Structure	:	By Lipschuists (Schaume`s outline series Mograw Hill Publication)
Fundamental of Computer Algorithm	:	By Ellis Horowitz & Sartaj Sawtney.

**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 treesect.
- 3 All practical works should be prepared in form of print out and valuated while Practical examination.

  
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## **INDUSTRIAL MICROBIOLOGY**

Paper	Title	Time	Marks
First	Agriculture and Food Microbiology	3 hrs.	50
Second	Fermentation Technology & Government Regulations	3 hrs.	50
	<b>PRACTICAL</b> Examination (including sessionals)	4 hrs.	(20+5) 25
	Viva-Voce Exam. based on "Summer Job-Training Report"		25

### **PAPER-I**

**(Paper Code-0930)**

### **AGRICULTURE AND FOOD MICROBIOLOGY M.M. : 50**

**UNIT-I** Soil fertility and management of agricultural soils. Influence of available nitrogen on soil-fertility. Importance of crop-rotation. Soil management. Management practices : Pesticides and their impact and effect on soil fertility.

**UNIT-II** Microbial diseases of crop plants with special reference to Wheat, Rice, Maize, Groundnut, Mustard, Grapes, Potato and Papaya.

**UNIT-III** Control of plant diseases. Chemical control of plant diseases. Biological Control- its mechanism and importance. Biopesticides. Concept of integrated pest management (IPM). Bacterial insecticides.

**UNIT-IV** Food spoilage mechanism, Spoilage of stored products, fruits and vegetables. Microbial spoilage of milk and meat. Food borne diseases.

**UNIT-V** Food preservation methods - Asepsis, Pasteurisation canning, dessication, low temperature, Anaerobiosis, filtration.  
Chemical preservation of food - salt and sugar, organic acids. Use of SO<sub>2</sub>, ethylene and propylene oxides, wood smoke.

### **PRACTICALS**

1. Study of microbial diseases of crop plants.
2. Study of effect of fungicides and insecticides on microorganisms.
3. Study of antagonistic activities amongst microorganisms.
4. Study of fungal contaminants from stored agricultural products.
5. Study of food spoilage microorganisms from sweets and bakery products.
6. Study of effect of the preservatives on the growth of microorganisms.
7. Study of UV radiations on microorganisms.
8. Study of the effect of agrochemicals on soil inhabiting microorganisms.

### **RECOMMENDED BOOKS :**

1. Modern Plant Pathology by Bilgramy and Dubey.
2. Food Microbiology by Frazier.
3. Microbiology by S.S. Purohit.
4. Microbiology by P.D. Sharma.
5. Agricultural Microbiology by Rangaswami.
6. Plant Pathology by R.S. Mehrotra.

*Handwritten signatures and dates:*  
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## PAPER-II

(Paper Code-0931)

### FERMENTATION TECHNOLOGY AND GOVERNMENT REGULATIONS

M.M. : 50

**UNIT-I** Fermentation equipments and production process. Principal types of fermenters - The batch fermenters, continuous stirred tank fermenters, Tubular fermenter, The fluidised bed fermenter, Solid State fermenters. Computer control of fermentation process. Strain improvement process.

**UNIT-II** Industrial production of organic acids - Lactic and citric acid.

Enzymes - amylase, protease and amino acids - L-lysine and glutamic acid.

**UNIT-III** Production of alcohol, wine, beer and acetic acid.

Production of antibiotics - Penicillin and Streptomycine.

Industrial production of vitamins - Vitamin B12 and Riboflavin.

**UNIT-IV** Importance of microorganisms in dairy industries. Production of cheese, Butter milk; and in bakery industries - leavening of bread, Indian fermented foods. Fungi and bacteria as a source of single cell proteins (SCP) and proteins.

**UNIT-V** Role of international organisation in biotechnology. Government programmes for biotechnology development. Government regulations of recombinant DNA research. Hazardous industrial wastes, Mycotoxin hazards in the production of fungal products. Regulations for disposal of biohazardous materials. Patenting of the products in Industries.

### PRACTICALS

1. Measurement of production of citric acid by *Aspergillus niger*.
2. Measurement and production of alcohol by yeast.
3. Demonstration of Transformation of steroids.
4. Demonstration of IAA production by microbes.
5. Demonstration of enzyme production by microorganisms.  
(a) Amylase (b) Cellulase
6. Demonstration of mushroom cultivation.

### RECOMMENDED BOOKS :

1. Industrial Microbiology by L.E. Casida.
2. Fermentation Technology by Whittakar.
3. General Microbiology, Vol. II, by Powar and Dagainawala.
4. Molecular Biology and Biotechnology by H.D. Kumar.
5. Elements of Biotechnology by P.K. Gupta.

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DAG 29/7/17

# Hemchand Yadav Vishwavidyalaya, Durg (C.G.)

Session 2021-22

June 2021 onwards

Class: B.Sc. Electronics

## Scheme of Examination

Paper Code	Course Opted	Title of Course	Theory	Practical	Grand Total	Minimum Passing Marks
<b>First Year</b>						
ELB-101	Core Course	Network Analysis And Analog Electronics	50		100	33
ELB-102	Core Course	Linear and Digital Integrated Circuits	50			
ELB-103P	Core Course Practical/Tutorial	Networks Analysis and Analog Electronics Lab	25	50	50	17
ELB-104P	Core Course Practical/Tutorial	Linear and Digital Integrated Circuits Lab	25			
<b>Second Year</b>						
ELB-201	Core Course	Communication Electronics	50		100	33
ELB-202	Core Course	Microprocessor and Microcontrollers	50			
ELB-203P	Course Practical/Tutorial	Communication Electronics Lab	25	50	50	17
ELB-204P	Course Practical/Tutorial	Microprocessor & Microcontroller Lab	25			
<b>Third Year</b>						
EL301	Skill Enhancement Course	Industrial Electronics	50		100	33
EL302	Skill Enhancement Course	Mobile Application Programming and Introduction to VHDL	50			
EL303P	Skill Enhancement Course Practical	Industrial Electronics Lab	25	50	50	17
EL304P	Skill Enhancement Course Practical	Mobile Application Programming and Introduction to VHDL Lab	25			

# **B . S c . P a r t I I I**

## **ELECTRONICS**

### **Paper I**

**ELB 301: Industrial Electronics**

**Theory:**

**Max. Marks: 50**

#### **Unit-1**

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

#### **Unit-2**

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

#### **Unit-3**

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

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

#### **Unit-4**

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

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

## Unit-5

**Analog/Digital Multimeter :** Analog multimeter, AC and DC measurement, conversion of analog output to digital form (A/D), Dual ramp A/D converter, digital measuring system, multimeter block diagram, voltage, current and resistance measurements. Frequency counter: Elements of electronic counter, decade counting assembly temperature compensated crystal 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. Moorthy Oxford University Press; First Edition edition
5. Printed circuit Board – Design & Technology by Walter C. Bosshart, Tata McGraw Hill.
6. Printed Circuit Board –Design, Fabrication, Assembly & Testing by R.S.Khandpur, TATA McGraw Hill Publisher
7. Electronics Instrumentation H.S.Kalsi McGraw Hill Education; 3 edition (1 July 2017)
8. Modern Electronic Instrumentation and Measurement Techniques Albert Helfrick and William D Cooper Prentice Hall India Learning Private Limited
9. Electronic Instrumentation and Measurements David A. Bell Oxford University Press India; Third edition (12 April 2013)

# Paper II

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

**Theory:**

**Max. Marks: 50**

### Unit-1

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

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

### Unit-2

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

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

### Unit-3

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

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

### Unit-4

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

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

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

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

## **Unit-5**

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

### **Suggested Books:**

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

# ELECTRONICS LABORATORY

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

<b>Experiment</b>	--	<b>30</b>
<b>Viva</b>	--	<b>10</b>
<b>Sessional</b>	--	<b>10</b>
<b>Total</b>	--	<b>50</b>

## **ELB 303P: INDUSTRIAL ELECTRONICS & PCB Design LAB (Hardware and Circuit Simulation Software)**

**MM-25**

### **Max.Marks:25**

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

### **Design and Fabrication of Printed Circuit Boards**

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

### **Suggested Books:**

1. Printed circuit Board – Design & Technology by Walter C. Bosshart, Tata McGraw Hill.
2. Printed Circuit Board –Design, Fabrication, Assembly & Testing by R.S.Khandpur, TATA McGraw Hill Publisher

### **ELB 304 P: Mobile Application & VHDL Lab**

**M.M. - 25**

#### **Mobile communication Lab**

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

#### **Introduction to VHDL**

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

## **B.A./B.Sc. – Third Year**

**Session: 2021-22**

Name of the Subject :- Anthropology  
Paper :- First  
Name of the Paper :- "FUNDAMENTALS OF HUMAN  
GENETICS, HUMAN GROWTH AND  
NUTRITION"

Total Marks : 50

Pass Marks : 17

### Syllabus

- UNIT-I Human Genetics: History, aims, scope and its application to human society  
Cell Division: Mitosis and Meiosis; Mendelism  
Chromosomes: Normal and Abnormal chromosomes.  
Concept of Genes, DNA & RNA.  
Types of Inheritance: Autosomal (Dominant and Recessive) & Sex linked Inheritance.
- UNIT-II Human Growth: Definition and scope of Human growth, Methods of studying human growth and development, Ageing
- UNIT-III Types of twins and their importance in genetic investigation.  
Inheritance of ABO Blood groups, P.T.C., Colour blindness and dermatoglyphics. Genetic Counselling, Eugenics.  
Population Genetics: Hardy- Weinberg Law
- UNIT-IV Nutrition: Nutritional requirement for normal growth. Common Nutritional disorders (Protein, Fat, Carbohydrate, Minerals and Vitamins).
- UNIT-V Ecology: Definition and Scope, Varieties of human ecosystems  
Environmental Pollution  
Biological Demography: Definition, nature and scope  
Demographic Profiles: Fertility, Mortality, Morbidity.



## B.A./B.Sc. – Third Year

Session: 2021-22

Name of the Subject :- Anthropology  
Paper :- Second  
Name of the Paper :- THEORIES IN SOCIAL-CULTURAL ANTHROPOLOGY

Total Marks: 50

Pass Marks: 17

### Syllabus

- UNIT-I The contributions made by the following Anthropologists to Social-Cultural Anthropology.  
(I) E. Durkheim, (II) F. Boas. (III) R. Redfield, (IV) A. L. Kroeber. (V) S.C. Dube, (VI) M.N. Shrinivas, (VII) L.P. Vidyarthi,
- UNIT-II Evolution: Biological and cultural evolution  
Evolutionism: Classical Evolutionism (E.B. Tylor & L.H. Morgan); Neo – Evolutionism (Leslie White & Gordon Childe)  
Diffusionism: British, German-Austrian (Kulture kreise) and American diffusionism (Cultural traits, Culture Complex, Culture Area, Culture focus)
- UNIT-III Function and structure:  
Functionalism (Malinowski)  
Structure Functionalism (Radcliff Brown)  
Structuralism (Levi - Strauss).
- UNIT-IV Personality and Culture:  
Basic personality and Model Personality (Cora-du-bois, Abraham Kardinar)  
Culture pattern: Configurationalism (Ruth Benedict)  
Anthropological study of National character  
Contribution of Margret Mead in study of National Character
- UNIT-V Field work tradition in Anthropology  
Major tools of Research: Schedule, Questionnaire, observation, interview, case study, Geneological Study  
Types of Anthropological Methods: Historical Method, Comparative Method and Functional Method.



## B.A. /B.Sc. – Third Year

Session : 2021-22

Name of the Subject :- Anthropology  
Paper No. :- Practical  
Name of the Paper :- SOMATOSCOPY, SOMATOMETRY AND GENETICAL TRAITS

Total Marks: 50

Pass Marks: 17

### Syllabus

#### OBJECTIVES:

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

#### Part-1 Somatoscopic Observation

- |                |         |
|----------------|---------|
| 1. Skin colour | 4. Hair |
| 2. Eye         | 5. Lips |
| 3. Nose        |         |

#### Part -2 Somatometry:

##### (a) Measurements on body:

- |                             |                            |
|-----------------------------|----------------------------|
| 1. Height vertex,           | 6. Tibiale height,         |
| 2. Height tragus,           | 7. Upper extremity length, |
| 3. Suprasternale height,    | 8. Sitting height,         |
| 4. Biacromial Breadth,      | 9. Height dactylyon,       |
| 5. Bi-illiocristal breadth, | 10. Body weight.           |

##### (b) Head and Face Measurement:

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

##### (c) Somatometry indices:

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

#### Part- 3 Genetic Traits:

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

#### Part-4 Statistics: Mean, Median, Standard deviation, $X^2$ test.



## **ELECTRONICS EQUIPMENT MAINTENANCE**

	<b>Max. Marks</b>	<b>Min. pass Marks</b>
Paper - I Trouble shooting and maintenance of audio and video Equipments.	50	17
Practical	50	17
Project	50	17

### **PAPER-I**

**(Paper Code - 0913)**

### **TROUBLE SHOOTING AND MAINTENANCE OF AUDIO AND VIDEO EQUIPEMENTS**

#### **UNIT-I REMOTE CONTROL AND SPECIAL CIRCUITS:**

Remote control, electromechanical control system, electronic touch tuning frequency synthesiser, TV tuner, automatic fone tuning (AFT), booster emplifier, automatic brightness control, instantious circuitry, picture tube boosters.

#### **ALIGNMENT AND SERVICING EQUIPMENTS :**

Antistatics and low leakage multimeters, soldering Iron, Vacuum tube voltmeter (VT VM) Cathode Ray Oscillouscope (CRO) single Generation Video pattern Generator Coulor Ilur Generation Vector Scope, High voltage probe Cable connectors shielding and Graunding.

#### **UNIT-II TELEVISION:**

Trouble shooting procedure, troubles shooting monochrome receivers, servicing of various functional blocks, trouble, shooting colour receivers, servicing circuit modeles, saprets precautions in television servicing.

**TELEVISION CAMERA TUBES :** Basic principles and maintenance recording.

#### **UNIT-III BLOCK DIGRAM OF VCR :**

Requirement of VCR, retaining video drums, helical scan, guard band, frequency response, serva systems, tape tension regulatar, real servo, system control. Different formats, the quacruplex format, type B segmented format, type C formet, the U matic format, the 1/2" V.H.S. format, 3-Max system.

#### **UNIT-IV SINGAL PROCESSING, CHROME PROCESSING :**

Colour under technique, recovery of down converted chrome signals, luminance processing. frequency modulation, deviation and band width, autometric gain correction, limited, pre-emphasis, replay of luminance signal, Y/C delay, drop out compensator, block diagram of main requirements, zero guard band system, turners and modulators, the modulator. Servo mechanisms and system control : Recording, playback, tracking, capstan servo system control, loading and tereading and play mode, record mode, auto stops, counter, audio video muting.

## UNIT-V CARE OF MECHANICAL SYSTEM:

Cleaning of head and tape path. Lubrication, replacement of parts, replacement of audio CTC head, replacement of video drum, dihedral error, table height, tape tension. drive tongue stop brenks.

### ELECTRONIC SYSTEM ALUGNMENTS:

Instruments, fault finding the power supply, free funning speed the servo system, tracking, video system, playback section alignment, amplifier balance and gain, luminance signal adjustment, D.O.C., F.M. demodulator, limited balance, carrier leak, noise canceller, colour processing, up conversion automatic colour correction, autometric face connection recording, luminance, synctip or clamping frequency, deviation set, white clip, chrominance, summary.

### NEW TECHNOLOGIES:

Industrial aspects of consumer electronics, jigs and fixture, quality control/ management, production techniques, business cycle new technologies, compact disc, laser disc.

## PAPER - II

(Paper Code - 0914)

### PRACTICAL

A student is required to do atleast 2 experiments in an acadmic year, and one month summer Training. The scheme of practical examination will be as follows :

(1) On experiment of 3 hours duration and one month summer Training.

(2) The marks for summer training will be awarded by the teachers teaching the students on the basis of the certificate issued by the external supervisor of the summer training.

Marks

Experiment	25	Marks
Sessional	10	Marks
on month summer training	15	Marks
<b>Total</b>	<b>50</b>	<b>Marsk</b>

Orientation and connection to TV antenna. Knowledge of booster connection and replacement. Knowledge of bloon Unit - different types (for different TV sets) and replacement of ballon, Replacement of front end.

Power supply and resistance cold tests. Voltage measurement at different points.

Horizontal and vertical oscilator checking and testing using CRO.

To see and read circuit diagram and to identity (Locate) various block on p/s, H and V deflection, video amplifier, audio, section, chroma section, IF section, tuner, tube and direction yokes (connecting and

adjustment).

Audio section wave form testing step by step-sound separator, sound take off from IF section and tenonwards to detector amplifier, IF alignment and loud speaker. (intercarrier sound take off).

If stage testing : IF alignment, tunner and band select.

Chroma processor : testing singals at various IC's.

Remote control studies-range, direction various, controls, IR transmitter and receiver, coding of signal.

Fault finding: cold testing and voltage testing of various parts. (Revision of parts

**HEMCHAND YADAV VISHWAVIDYALAYA, DURG (C.G.)**

**B.Sc. III  
BIOTECHNOLOGY  
PAPER – I**

**PLANT, ENVIRONMENTAL AND INDUSTRIAL BIOTECHNOLOGY**

**MM-50**

**UNIT-I**

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

**UNIT-II**

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

**UNIT-III**

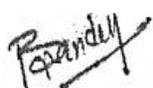
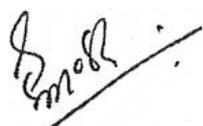
1. General Introduction and Scope of Environmental Biotechnology.
2. Environmental Pollution and its type.
3. Solid Waste Management: Principle of management, Types of Sources, Effect of Solid waste, Concept of composting and Vermi composting.
4. Wastewater Treatment: Physical, Chemical, and Biological.

**UNIT-IV**

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

**UNIT-V**

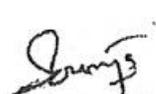
1. Types of Bioreactor: Design of Stirred tank, Fluidized bed.
2. Fermentation: Lactic acid and Alcohol.
3. Industrially important Microorganisms: Isolation, Preservation (Slant, Mineral Oil and Lyophilize) and its application.
4. Food Technology: Food spoilage. Canning, Packing and Food Preservation.



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**B.Sc. III  
BIOTECHNOLOGY**

**PAPER – II**

**IMMUNOLOGY, ANIMAL AND MEDICAL BIOTECHNOLOGY**

**MM-50**

**UNIT-I**

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

**UNIT-II**

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

**UNIT- III**

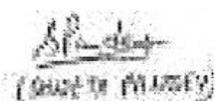
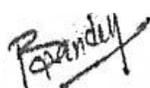
1. Antigen-Antibody Interaction: Agglutination, Precipitation, RIA, ELISA, Immuno Electrophoresis and Immunofluorescence.
2. Immunity of Infectious Diseases: Protozoa (Malaria, Kalaazar), Bacteria (T.B., Typhoid) and Virus (Influenza, Pox).
3. Fundamental of Epidemic Diseases: Swine flu and Dengue.

**UNIT-IV**

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

**UNIT-V**

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



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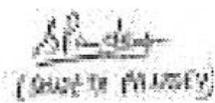
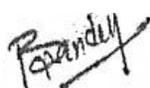
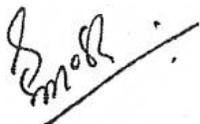


CHIEF OF INSTITUTION



## List of Books-

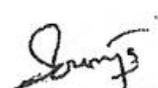
1. A test Book of Biotechnology: Indu Shekher Thakur, 2<sup>nd</sup> edition. I.K. International Pvt. Ltd., New Delhi.
2. Biotechnology (Fundamentals and Applications): S.S. Purohit - Agrobios (India), Jodhpur.
3. Fundamentals of Microbiology and Immunology: Ajit Kr. Banerjee, Nirmalya Banerjee -New 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. 7<sup>th</sup> 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, Grissemen & Jones 2<sup>nd</sup> edition.
13. Tools and Techniques in Biotechnology (2011) M. Debnath



(S.S. Purohit)



(M. Debnath)

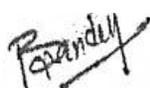


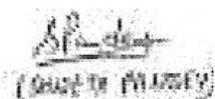
## List of Practical's

### 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





  
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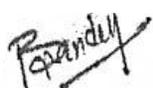
## SCHEME FOR PRACTICAL EXAMINATION

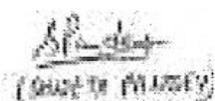
**Time: 4 hrs.**

**MM-50**

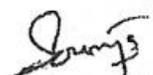
- |                                   |          |
|-----------------------------------|----------|
| 1. Experiment based on Paper - I  |          |
| (i) Plant tissue culture          | 08 marks |
| (ii) Environment / Industrial     | 07marks  |
| 2. Experiment based on Paper - II | 15 marks |
| 3.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





  
(CHIEF OF EXAMINATIONS)

  
THE CHIEF EXAMINER





**BIOCHEMISTRY**  
**PAPER - I**  
**MOLECULAR BIOLOGY**

**UNIT-I-BASIC CONCEPTS OF GENETIC INFORMATION**

- a. Nucleic acids as genetic information carriers, experimental evidence e.g. bacterial genetic transformation, Hershey - Chase Experiment, TMV reconstitution experiment.
- b. Central dogma of molecular genetics - current version, reverse transcription and retroviruses.
- c. Primary structure of nucleic acids and their properties, silent features of eukaryotic, prokaryotic and viral genome; highly repetitive, moderately repetitive and unique DNA sequences.
- d. Basic concepts about the secondary structures of nucleic acids, 5' 3' direction antiparallel strands, base composition, base equivalence, base pairing and base stacking in DNA molecule. and buoyant density and there.

**UNIT-II-STRUCTURAL LEVELS OF NUCLEIC ACIDS AND SEQUENCING**

- a. Secondary and tertiary structure of DNA : Watson and Crick model, A.B. and Z types of DNA major and minor grooves, chirality of DNA, tertiary structure of DNA.
- b. Structure and properties of RNA; Classes of RNA secondary and tertiary structures.
- c. Nucleic acid hybridization : Cot value and satellite DNA.
- d. Sequencing : Restriction and modification system; sequencing of DNA and RNA.

**UNIT-III a. DNA REPLICATION**

DNA replication in prokaryotes - conservative, semi conservative and dispersive types, experimental evidence for semi conservative replication. DNA polymerases, other enzymes and protein factors involved in replication. Mechanism of replication. Inhibitors of DNA replication.

## **b. TRANSCRIPTION**

Transcription in prokaryotes RNA polymerase, promoters, initiation, elongation and termination of RNA synthesis, inhibitors of transcription. Reverse transcriptase, post transcriptional processing of RNA in eukaryotes.

## **UNIT-IV TRANSLATION AND REGULATION OF GENE EXPRESSION**

- a. Genetic code : Basic feature of genetic code, biological significance of degeneracy. Wobble hypothesis, gene within genes and overlapping genes.
- b. Mechanism of translation : Ribosome structure, A and P sites, charged tRNA, f-mat-tRNA initiator codon, Shine Dalgarno consensus sequence (AGGA), formation of 70S initiation complex, role of EF-Tu, EF-Ts, EF G and GTP, nonsense codons and release factors RF 1 and RF 2.
- c. Regulation of gene Expression in prokaryotes : Enzyme induction and repression, operon concepts, Lac operon, Trp operon.

## **UNIT-V MUTATION AND REPAIR**

- a. Mutation: Molecular basis of mutation, types of mutation, e.g. transition, transversion frame shift, insertion, deletion, suppresser sensitive, germinal and somatic, backward and forward mutations, true reversion and suppression, dominant and recessive mutation, spontaneous and induced mutations = Lederberg's replica plating experiment.
- b. Mutagenicity testing : Correlation of mutagenicity and carcinogenicity : Ames testing, Random and site directed mutagenesis.
- c. DNA Repair : UV repair system in E.Coli, Significance of thymine in DNA.

## **RECOMBINATION AND TECHNOLOGY**

Restriction endonucleases, brief discussion of steps in DNA cloning. Application of recombinant DNA technology.

### **Books:**

1. Biochemistry J David Rawn, Neil Patterson Publisher, North Carolina.
2. Molecular biology of the gene JD Watson, NH Hopkins, JW Robert, JP Stretz, AM Weiner, Freeman San Francisco.
3. Fundamental of biochemistry by D Voet and CW Pratt, John Wiley & Sons, NY.
4. Text book of biochemistry Thomas M Devin, John Weley & Sons, NY.

**PAPER - II**  
**NUTRITIONAL, CLINICAL & ENVIRONMENTAL BIOCHEMISTRY**

**M.M.-50**

**UNIT-I NUTRITIONAL BIOCHEMISTRY**

**Nutrition and dietary habits**

- a. Introduction and definition of foods and nutrients. Factors determining food acceptance, physiological, energy, body building (growth and development).  
  
Regulation of body temperature. Physiology and nutrition of carbohydrates, fats, proteins and water. Vitamins A,D,E,K, Vit B-Complex and Vit C and minerals like Ca, Fe and Iodine and their biological functions. Basic food groups : energy giving foods, body building foods and protective foods.
- b. Composition of balanced diet, recommended dietary allowances (RDA) for average Indian, locally available foods, inexpensive quality foods and food stuffs rich in more than one nutrients. Balanced vegetarian diet, emphasis on nutritional adequacy.

**UNIT-II NUTRITIVE AND CALORIFIC VALUES OF FOODS**

- a. Basic concepts of energy expenditure, units of energy, measurement of energy expenditure by direct or indirect calorimetry, calculation of non protein RQ with respect to carbohydrates and lipids. Determination of heat production of the diet. The basal metabolism and method of measuring basal metabolic rate (BMR) energy requirements during growth, pregnancy, lactation and various physiological activities. Calculation of energy expenditure of average man and women.

- b. Specific dynamic action (SDA) of foods, nutritive value of various kinds of foods generally used by Indian population. Planning of dietary regimes for infants, during pregnancy and old age. Malnutrition, its implications and relationship with dietary habits and prevention of malnutrition especially protein-calories malnutrition (Kwashiorkor and Marasmus) by improvements of diets. Human milk and its virtues, breast vs formulated milk feeding. Food preservation standards, food adulterations and precautions, government regulations on preservation and quality of food.

### **UNIT-III CLINICAL BIOCHEMISTRY**

#### **i) Basic concepts of clinical biochemistry**

- a. Definition and scope of clinical biochemistry in diagnosis, a brief review of units and abbreviation used in expression concentration and standard solutions. Quality control. Manual vs automation in clinical laboratory.
- b. Collection and preservation of biological fluids (blood, serum, plasma, urine and CSF) Chemical analysis of blood, urine and CSF. Normal values for important constituents (in SI units) in blood (plasma / serum), CSF and urine, clearance test for urea.

### **UNIT-IV (i) CLINICAL ENZYMOLOGY**

- a. Definition of functional and non-functional plasma enzymes. Isozymes and diagnostic tests. Enzymes pattern in health and diseases with special mention of plasma lipase, amylase, cholinesterase, alkaline and acid phosphatase, SGOT, SGPT, LDH and CPK.
- b. Functional tests of kidney, liver and gastric fluids.
- (i) Hypo and hyper-glycemia, glycogen storage diseases, lipid malabsorption and steatorrhea, sphingolipidosis, role of lipoproteins. Inborn errors of amino acid metabolism alkaptonuria, phenyl-ketonia, albinism, gout and hyper-uricemia.

### **UNIT-V ENVIRONMENTAL BIOCHEMISTRY**

- (i) **Air pollution** : Particulate matter, compounds of carbon, sulphur, nitrogen and their interactions, methods of their estimation, their effect on atmosphere.
- (ii) **Water pollution** : Types of water bodies and their general characteristics, major pollutants in domestic, agricultural and industrial wastes, methods of their estimation, effects of pollutants on plants and animals, treatment of domestic and industrial wastes, solid-wastes and their treatment.

**Books :**

1. Modern nutrition in health and disease by Whol and Goodhart.
2. Human nutrition and Dietetics-S. Davidson and passmore-ELBS Zurich.
3. Tietz fundamental of clinical Chemistry by Cart A Burits & ER Ashwood Saunders WB Co.
4. Leacture Notes on Clinical Biochemistry-LG Whitby, AF Smith, GJ Beckett.

**PRACTICAL FOR IIIrd YEAR  
LABORATORY - III (BCH 305)**

1. Estimation of DNA by diphenylamine method.
2. Effect of temperature on the viscosity of DNA using Ostwald's Viscometer.
3. Extraction of RNA and its estimation by Orcinol method.
4. Estimation of hemoglobin by measuring total iron in blood.
5. Estimation of calcium and phosphorus in serum & urine.
6. Estimation of creatine and creatinine in urine.
7. Estimation of immunoglobulins by precipitation with saturated ammonium sulphate.
8. Denaturation fo enzyme, studies on DNA.
9. a. Separation of proteins by column chromatography. b. Determination of proteins by dye binding assay.
10. Separation of proteins by SDS-polyacrylamide gel electrophoresis.