

# B. Sc. Bioscience

## Scheme of Examination

### B.Sc. I Year

Paper	Name of Paper	Max Marks	Total Marks	Min Marks
Paper – I	Cell Biology and Genetics	50	100	33
Paper – II	Biodiversity and Systematics of Plants and Microbes	50		
Practical	Based on Paper - I & - II		50	17

### B.Sc. II Year

Paper – I	Ecology, Environmental Biology, Evolution and Behaviour	50	100	33
Paper – II	Biodiversity and Systematics of Invertebrates and Vertebrates	50		
Practical	Based on Paper - I & - II		50	17

### B.Sc. III Year

Paper – I	Plant and Animal Physiology, Development and Biochemistry	50	100	33
Paper – II	Biostatistics, Computer and Bioinformatics	50		
Practical	Based on Paper - I & - II		50	17

<b>Syllabus</b>	
<b>B.Sc. II Year</b>	
<b>Paper – I</b>	<b>Ecology, Environmental Biology, Evolution and Behaviour</b>
Unit – I	Ecology: Definition, Scope and Importance. Ecological factors: Abiotic and biotic factor. Ecosystem: Types of Ecosystem, Components of ecosystem. Energy flow in the Ecosystem: Energy flow models. Food Chains and Food Web. Ecological pyramids. Ecological succession.
Unit – II	Air pollution: Evolution and composition of atmosphere, Chemical and photochemical reactions in the atmosphere, Air pollutants, Control of air pollution. Water pollution: Sources of water pollution, Hydrologic cycle, water quality standards, Eutrophication and algal blooms.
Unit – III	Industrial pollution: Sources and major pollutants. Bioremediation: Types and techniques. Solid waste management. Environmental impact assessment. Pollution control laws and acts.
Unit – IV	Evolution: Basic concepts. Theories of organic evolution Patterns of evolution: Divergent and convergent evolution, parallel evolution, co-evolution. Evolution in action: Variations, mutations, recombination, ploidy, isolation, Natural selection, Concept of species and speciation. Micro and Macroevolution
Unit – V	Concepts and patterns of behaviour. Instinct and learning: Innate behavior, Learned behaviour and types of learning, Genetic basis of behaviour. Control of behavior: Neural, hormonal and pheromonal. Social organization: Communication, Living in groups, Eusocial organization. Migration, orientation and navigation
<b>Paper – II</b>	<b>Biodiversity and Systematics of Invertebrates and Vertebrates</b>
Unit – I	General characters and classification of Invertebrates up to orders with examples emphasizing their biodiversity, economic importance and conservation measures. Protozoa: Plasmodium. Protozoa and diseases. Porifera: Sycon. Coelentrata: Obellia. Helminths: Liver fluke
Unit – II	Annelida: Nereis, Metamorphism and Trocophore larvae. Arthropoda: Prawn. Mollusca: Pila. Echinodermata: Star fish, Echinoderm larvae. Hemichordata: Balanoglossus
Unit – III	Chordata: Origin and Classification. Protochordata; Classification up to orders, interrelationships, Urochordates; Amphioxus Agnatha: Petromyzon, Fishes: skin and scales, Migration and Parental care
Unit – IV	Amphibia : Parental care, Neoteny. Reptiles : Extinct reptiles, poisonous and non-poisonous snakes, poisonous apparatus and snake venom

Unit – V	Birds: Migration, Ratitae, Flight adaptation. Mammals; Aquatic mammal, Dentition in mammal, Prototheria and Affinities
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Practical	<ol style="list-style-type: none"> <li>1. Determination of density, abundance and frequency of biota from grasslands</li> <li>2. Determination of temperature and pH of the industrial effluents.</li> <li>3. Determination of phenolphthalein, methyl orange and total alkalinities and free and total CO<sub>2</sub> of industrial effluents</li> <li>4. Determination of phosphate, sulphate, nitrate, nitrite and ammonia nitrogen of industrial effluents.</li> <li>5. Determination of DO of industrial effluents</li> <li>6. Collection and identification of plants and animal species from different industrial effluent channels.</li> <li>7. Study of specimens of representative examples of different phylum (Classification up to order).</li> <li>8. Study of permanent slides of different sections of representative examples as per theory syllabus.</li> <li>9. Microscopic techniques including unstained and stained permanent mount of animal material.</li> <li>10. Examination of local fauna of different ponds.</li> <li>11. Phototactic behaviour in <i>Mimosa pudica</i> and fish</li> <li>12. Learning behaviour of cockroach, mice</li> <li>13. Reasoning behaviour of mouse and rat</li> <li>14. Study of representative examples of the different chordates (classification and characters)</li> <li>15. Simple microscopic techniques through unstained and stained permanent mounts</li> <li>16. Study of histological slides in accordance with the theory papers.</li> <li>17. Study of osteology of different chordates</li> </ol>
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Books Recommended	<ol style="list-style-type: none"> <li>1. Odum EP: Ecology</li> <li>2. PD Sharma: Fundamentals of Ecology</li> <li>3. Moody: Introduction to Evolution</li> <li>4. Paul L. Bishop - Pollution Prevention: Fundamentals and Practice</li> <li>5. Marquita K. Hill - Understanding Environmental Pollution: A Primer</li> <li>6. Daniel Vallero - Fundamentals of Air Pollution, Fourth Edition</li> <li>7. Kenneth M. Vigil - Clean Water: An Introduction to Water Quality and Pollution Control</li> <li>8. W.Wesley Eckenfelder - Industrial Water Pollution Control</li> <li>9. A.G. Clarke - Industrial Air Pollution Monitoring - Gaseous and particulate emissions</li> <li>10. Harry M. Freeman - Industrial Pollution Prevention Handbook</li> <li>11. Alcock (2009): Animal Behaviour: An Evolutionary Approach</li> <li>12. Grier (1984): Biology of Animal Behaviour</li> <li>13. Lorenz (1981): The Foundation of Ethology</li> <li>14. Manning &amp; Dawkins (1998): An Introduction to Animal Behaviour</li> <li>15. Mcfarland (1985): Animal Behaviour: Psychology, Ethology and Evolution</li> <li>16. Scott (2005): Essential Animal Behaviour</li> <li>17. Anil Kulshreshtha: Unified Practical Zoology</li> </ol>
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|  | <ol style="list-style-type: none"><li>18. Michael Stachowitsch, Sylvie Proidl (Illustrator): The invertebrates: An illustrated glossary</li><li>19. L.H. Hyman: The Invertebrata vol I &amp; II</li><li>20. Rouer and Parsons – The Vertebrate Body, Saunders</li><li>21. Kotpal: Modern text book of Zoology: Invertebrates (11<sup>th</sup> ed. 2016 Rastogi)</li><li>22. Kotpal: Modern text book of Zoology: Vertebrates (4<sup>th</sup> ed. 2016 Rastogi)</li><li>23. Jordan &amp; Verma: Invertebrate Zoology (Reprint 2014, S. Chand)</li><li>24. Jordan &amp; Verma: Chordate Zoology (Reprint 2014, S. Chand)</li></ol> |
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बी.ए./बी.एस-सी. द्वितीय वर्ष

सत्र : 2018-19

विषय का नाम	:-	मानवविज्ञान
प्रश्न पत्र	:-	प्रथम
प्रश्न पत्र का नाम	:-	पुरातात्विक मानवविज्ञान

पूर्णांक :- 50

उत्तीर्णांक :- 17

पाठ्यक्रम

- इकाई 1 - पुरातात्विक मानवविज्ञान का अर्थ एवं क्षेत्र, पुरातात्विक मानवविज्ञान की शाखाएँ : शास्त्रीय पुरातत्वशास्त्र, ऐतिहासिक पुरातत्वशास्त्र, पुरा-ऐतिहासिक पुरातत्वशास्त्र एवं आध-ऐतिहासिक पुरातत्वशास्त्र, पुरातत्वशास्त्र के रूप में मानवविज्ञान। प्राचीन विश्व एवं नव युग पुरातत्वशास्त्रीय परंपराओं के मध्य अंतर। सापेक्ष एवं निरपेक्ष काल निर्धारण।
- इकाई 2 - भू-गर्भीय समय सारणी, महान हिमयुग हिमयुग के स्तरीकरण एवं अन्य प्रमाण : नदी वेदिकाएँ, हिमोढ़, अतिवृद्धि अनावृद्धि, पाषाण काल उपकरण : प्रकार एवं तकनीक।
- इकाई 3 - पुरापाषाणिक बर्बरता की आयु : यूरोपीयन निम्न पुरापाषाणिक काल : पाषाण उपकरण एवं संस्कृतियाँ। भारतीय निम्न पुरापाषाणिक काल : सोहन संस्कृति एवं मद्रासीयन संस्कृति। यूरोपीयन मध्य पुरापाषाणिक काल : उपकरण एवं संस्कृति भारत में फलैक उपकरण संकुल यूरोपीयन उच्च पुरापाषाणिक काल : उपकरण एवं संस्कृतियाँ, यूरोपीयन पुरापाषाणिक गृह एवं गुफा कला के महत्व एवं लक्षण।
- इकाई 4 - उत्तरी यूरोप में मध्यपाषाणिक संकुल। पश्चिमी यूरोप में मध्यपाषाणिक संकुल। भारत में मध्यपाषाणिक संस्कृति। नवपाषाणिक क्रान्ति के मुख्य लक्षण भारत में नवपाषाणिक संकुल
- इकाई 5 - धातु युग : ताम्र, कांस्य एवं लौह युग। नगरीय क्रान्ति : सामान्य लक्षण सिंधु घाटी सभ्यता : मुख्य लक्षण, शहर नियोजन, आर्थिक क्रियाविधि, उत्पत्ति एवं पतन।
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## बी.ए./बी. एस-सी. द्वितीय वर्ष

सत्र : 2018-19

विषय का नाम	:-	मानवविज्ञान
प्रश्न पत्र	:-	द्वितीय
प्रश्न पत्र का नाम	:-	भारत में जनजातीय संस्कृति

पूर्णांक :- 50

उत्तीर्णांक :- 17

### पाठ्यक्रम

- इकाई 1 – जनजाति एवं अनुसूचित जनजाति की परिभाषा। भारतीय जनजातियों के भौगोलिक वितरण एवं उनके प्रजातीय एवं भाषायी वर्गीकरण, भारतीय जनजातियों के अध्ययन में मानवविज्ञान का योगदान।  
पवित्र संकुल, सार्वभौमिकता एवं स्थानीयता, संस्कृतिकरण, पश्चिमीकरण, प्रभु-जाति।  
जनजाति एवं जाति, अनुसूचित जनजाति एवं अनुसूचित जाति के मध्य अंतर।  
छत्तीसगढ़ के विशेष रूप से कमजोर जनजाति (कमार, बिरहोर, पहाड़ी कोरवा, अबूझमाड़िया एवं बैगा)
- इकाई 2 – आदिम अर्थव्यवस्था :  
जनजाति अर्थव्यवस्था के स्तर : शिकार, खाद्य-संग्रहण, मतस्यमारण, स्थानांतरित एवं स्थायी कृषि।  
संपत्ति की अवधारणा एवं जनजातीय समाजों में स्वामित्व।  
जनजातीय लोगों की समस्याएँ : भूमि अधिग्रहण, बंधुवा मजदूरी, ऋणग्रस्तता, स्थानांतरित कृषि, सिंचाई, बेरोजगारी, कृषि मजदूरी, जंगल और जनजातियाँ।  
नव-आर्थिक मानवविज्ञान : विनिमय – उपहार, वस्तु विनिमय, व्यापार, सांस्कृतिक विनिमय एवं बाजार अर्थव्यवस्था।
- इकाई 3 – सांस्कृतिक संपर्क की समस्या : शहरीकरण एवं औद्योगीकरण संबंधी समस्याएँ, क्षेत्रवाद, जनजातीय धर्म : उत्पत्ति एवं प्रकार्य, आत्मावाद, टोटमवाद, अभिचार एवं जादू की अवधारणा एवं क्रियाकलाप, शमनवाद, सिरछेदन।
- इकाई 4 – भारतीय जनजातियों के राजनैतिक संगठन : राज्य एवं राज्याविहीन समाज के मध्य अंतर।  
आदिम समाज में कानून  
भारतीय जनजातियों में सामाजिक संगठन : मातृस्वामित्व एवं पितृस्वामित्व परिवार, वंश एवं गोत्र, जनजातीय समाजों में विवाह साथी चुनने के तरीके।  
युवागृह : प्रकार, संगठन एवं प्रकार्य।

इकाई 5 – जनजातीय विकास : जनजातीय विकास का इतिहास, अनुसूचित जनजातियों के लिए संवैधानिक प्रावधान। जनजातीय समस्याएँ : पृथक्करण, प्रवासन, संस्कृति संक्रमण अजनजातीयकरण।  
जनजातीय विकास की नीतियाँ, योजना एवं कार्यक्रम एवं उनका क्रियान्वयन।  
भारत में जनजातीय असंतोष।  
जनजातीय विकास में मानवविज्ञान का योगदान।  
सरकारी एवं गैर-सरकारी विकासीय कार्यक्रमों के प्रति जनजातीय लोगों की प्रतिक्रिया।

बी.ए./बी. एस-सी. द्वितीय वर्ष

सत्र : 2018-19

विषय का नाम	:-	मानवविज्ञान
प्रश्न पत्र	:-	प्रायोगिक
प्रश्न पत्र का नाम	:-	भौतिक संस्कृति एवं शोध उपकरण

पूर्णांक :- 50

उत्तीर्णांक :- 17

पाठ्यक्रम

उद्देश्य - इस प्रश्न-पत्र का प्रमुख उद्देश्य छात्र-छात्राओं को आदिम भौतिक संस्कृति एवं प्रौद्योगिकी से परिचय कराना है। साथ ही सामाजिक मानवविज्ञान में सामान्य रूप से उपयोग होने वाली तकनीकी का भी ज्ञान करना है।

भौतिक संस्कृति -

भाग 1 - दिये गये भौतिक संस्कृतियों की पहचान एवं तकनीकी का वर्णन -

1. खाद्य संकलन, शिकार, मतस्य आखेट एवं कृषि उपकरणों का विवरण।
2. आग उत्पन्न करने वाली विधि एवं उपकरणों का वर्णन।
3. आवास के प्रकार का वर्णन।
4. भूमि एवं जल यातायात को साधनों का वर्णन।

भाग 2 - पुरापाषाण काल, मध्यपाषाण काल एवं नव-पाषाण काल के उपकरणों की पहचान, चित्रण एवं विवरण।

(प्रत्येक काल के पाँच उपकरणों का विवरण देना आवश्यक है।)

भाग 3 - अनुसूची, वंशावली एवं प्रश्नावली का निर्माण।

प्रत्येक छात्र-छात्राओं को उपरोक्त उपकरण के माध्यम से 10 उत्तदाताओं से आंकड़ों की जानकारी प्राप्त करना चाहिए।

प्रत्येक छात्र-छात्राओं को प्रायोगिक कक्षा के दौरान इन समस्त भाग से संबंधित प्रायोगिक आँकड़े को प्रायोगिक फाईल में दर्ज करना आवश्यक है।



**B.Sc. II  
BIOTECHNOLOGY**

**PAPER – I**

**MOLECULAR BIOLOGY & BIOPHYSICS**

**M.M. 50**

**UNIT-I**

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

**UNIT-II**

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

**UNIT-III**

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

**UNIT –IV**

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

**UNIT –V**

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

## **List of Books**

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

**B.Sc. II  
BIOTECHNOLOGY**

**PAPER II**

**RECOMBINANT DNA TECHNOLOGY AND GENOMICS**

**M.M. 50**

**UNIT-I**

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

**UNIT –II**

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

**UNIT –III**

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

**UNIT-IV**

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

**UNIT-V**

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

## **List of Books**

1. B.D. Singh (2004) *Biotechnology, Expanding Horizons*. First Edition. Kalyani Publishers, Ludhiana.
2. P.K. Gupta (2005) *Biotechnology and Genomics*, Rastogi Publication, Meerut.
3. Stan bury and Whittaker - *Principles of Sterilization techniques*. First Indian reprint Edition (1997). Aditya Book (P) Ltd. New Delhi.
4. L.E. Casida (1994) *Industrial Microbiology* Edition .
5. A.H. Patel (2003) *Industrial Microbiology* 4th Edition.
6. K.S. Bilgrami and A.K. Pandey(1998) *Introduction to Biotechnology* Edition 2nd (1998)
7. U Satyanarayan (2005) *Biotechnology*, First Edition Books and Allied (P) Ltd. Kolkata.
8. Atul kumar and VandanaA.Kumar (2004) *Plant Biotechnology and tissue culture, Principle and Perspectives*, International Books Distributing Co. Lucknow.
10. S Choudhuri, and DB Carlson (2008) *Genomics: Fundamentals and applications*, 1st edition.
11. TK Attwood and DJ Parry (2009) *Introduction of Bioinformatics*.
12. Philip E Bourne Helge Whisking (2003) *Structural Bioinformatics*.
13. Des Higgins and Willie Taylor (2000) *Bioinformatics Sequence, Structure and Databanks*.

## **List of Practical's**

### **MOLECULAR BIOLOGY, BIOPHYSICS, RECOMBINANT DNA TECHNOLOGY AND GENOMICS**

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

Experiment based on-

4. Centrifugation
5. Spectrophotometer/Colorimeter
6. Electrophoresis
7. Paper chromatography/TLC

Experiment based on Bioinformatics -

8. Retrieve DNA /Protein sequence from Biological Data Bases (NCBI).
9. Use of tools studied

## SCHEME FOR PRACTICAL EXAMINATION

**Time: 4 hrs. M.M.: 50**

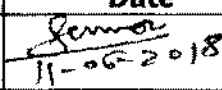

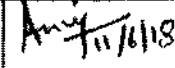

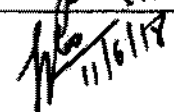
- |                                       |          |
|---------------------------------------|----------|
| 1. Experiment based on DNA/RNA        | 10 marks |
| 2. Experiment based on Instruments    | 10 marks |
| 3. Experiment based on Bioinformatics | 10 marks |
| 4. Spotting                    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

प्रपत्र

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

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

केन्द्रीय अध्ययन मंडल के अध्यक्ष एवं सदस्यों का हस्ताक्षर

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

11 12 12

## INFORMATION TECHNOLOGY

### PAPER - I

#### DIGITAL CIRCUITS & COMPUTER H/W

(Paper Code - 0874)

**UNIT-I (A) Number Systems :**

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

**(B) Boolean Algebra :**

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

**UNIT-II Combinational circuits :**

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

**UNIT-III Multivibrator circuits :**

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

Integrated circuits :

RTL, DTL, TTL, CMOS, MOS.

**UNIT-IV (A) Central Processing Unit :**

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

**(B) I/O organisation :**

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

**UNIT-V Memory organisation :**

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

**REFERENCE TEXT BOOK :**

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

### PAPER - II

(Paper Code - 0875)

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

B.S.-II

(54)

*Suresh*  
11/06/18

*Anuj*  
11/06/18  
(Mr. A.K. Dainod)

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

*Hemant*  
11/06/18  
(Dr. T. Durga Prasad)

*Harish*  
11/06/18  
Harish Harish  
Prasad Tare



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

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

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

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

**REFERENCE TEXT BOOKS :**

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

**PRACTICAL WORK**

- 1 The sufficient Practical work should be done for understanding the paper 2.
- 2 At least five programs on each unit from unit 2 to unit 5 be prepared.
- 3 All practical works should be prepared in form of print outs and be valued while practical examination.

B.S.-II

(55)

*Suresh*  
11/06/18

*Anuj*  
11/06/18  
(Dr. A.K. Dwivedi)

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

*Har*  
11/06/18  
(Dr. J. Dugga)

*Har*  
11-06-18  
Harish  
Prasad

## प्रपत्र

विषय/संकाय/प्रश्नपत्र का नाम: **B.A. Part-II (Mathematics)**

### **Paper-I (ADVANCED CALCULUS)**

प्रश्नपत्र का पाठ्यक्रम यथावत है।

### **Paper-II (DIFFERENTIAL EQUATIONS)**

प्रश्नपत्र का पाठ्यक्रम यथावत है।

### **Paper-III (MECHANICS)**

प्रश्नपत्र का पाठ्यक्रम यथावत है।

**Prof.H.K.Pathak**

**Prof.B.S.Thakur**

**Prof.M.A.Siddiqui**

**Dr.S.K.Bhatt**

**Dr.R.K.Mishra**

**Dr.A.K.Mishra**

**S.K.Gupta**

**Sangeeta Pandey**

## MATHEMATICS

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

### B.A. Part-II

#### Paper-I

### ADVANCED CALCULUS

- UNIT-I Definition of a sequence. Theorems on limits of sequences. Bounded and monotonic sequences. Cauchy's convergence criterion. Series of non-negative terms. Comparison tests. Cauchy's integral test. Ratio tests, Raabe's. Logarithmic, De Morgan and Bertrand's tests. Alternating series. Leibnitz's theorem. Absolute and conditional convergence.
- UNIT-II Continuity, Sequential continuity, Properties of continuous functions. Uniform continuity, Chain rule of differentiability. Mean value theorems and their geometrical interpretations. Darboux's intermediate value theorem for derivatives. Taylor's theorem with various forms of remainders.
- UNIT-III Limit and continuity of functions of two variables. Partial differentiation. Change of variables. Euler's theorem on homogeneous functions. Taylor's theorem for functions of two variables. Jacobians.
- UNIT-IV Envelopes, evolutes. Maxima, minima and saddle points of functions of two variables. Lagrange's multiplier method.
- UNIT-V Beta and Gamma functions, Double and triple integrals, Dirichlet's integrals, Change of order of integration in double integrals.

#### REFERENCES :

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

**B.A. Part-II**  
**Paper-II**  
**DIFFERENTIAL EQUATIONS**

- UNIT-I Series solutions of differential equations- Power series method. Bessel and Legendre functions and their properties-convergence, recurrence and generating relations. Orthogonality of functions, Sturm-Liouville problem, Orthogonality of eigen-functions, Reality of eigen values. Orthogonality of Bessel functions and Legendre polynomials.
- UNIT-II Laplace Transformation- Linearity of the Laplace transformation, Existence theorem for Laplace transforms, Laplace transforms of derivatives and integrals. Shifting theorems. Differentiation and integration of transforms. Convolution theorem. Solution of integral equations and systems of differential equations using the Laplace transformation.
- UNIT-III Partial differential equations of the first order. Lagrange's solution. Some special types of equations which can be solved easily by methods other than the general method. Charpit's general method of solution.
- UNIT-IV Partial differential equations of second and higher orders, Classification of linear partial differential equations of second order, Homogeneous and non-homogeneous equations with constant coefficients, Partial differential equations reducible to equations with constant coefficients, Monge's methods.
- UNIT-V Calculus of Variations- Variational problems with fixed boundaries- Euler's equation for functionals containing first order derivative and one independent variable, Extremals. Functionals dependent on higher order derivatives, Functionals dependent on more than one independent variable, Variational problems in parametric form, invariance of Euler's equation under coordinates transformation.
- Variational Problems with Moving Boundaries- Functionals dependent on one and two functions, One sided variations.
- Sufficient conditions for an Extremum- Jacobi and Legendre conditions, Second Variation. Variational principle of least action.

**REFERENCES :**

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

**B.A. Part-II**  
**Paper-III**  
**MECHANICS**

**STATICS**

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

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

**DYNAMICS**

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

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

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

**REFERENCES :**

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

**New Proposed Syllabus**  
**For**  
**UNDERGRADUATE PROGRAMME**  
**(B.Sc. PROGRAM in PHYSICS)**



# B.Sc. Programme in Physics

## Course structure

### B.Sc. - Part-I

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

### B.Sc. - Part-II

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

### B.Sc.- Part-III

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

UNIT	Current Course	New Proposed Course	Justification
I	<p>The laws of thermodynamics : The Zeroth law, concept of path function and point function, various indicator diagrams, work done by and on the system, first law of thermodynamics, internal energy as a state function, reversible and irreversible change, carnot theorem and the second law of thermodynamics. Different versions of the second law. Clausius theorem inequality. Entropy, Change of entropy in simple cases (i) Isothermal expansion of an ideal gas (ii) Reversible isochoric process (iii) Free adiabatic expansion of an ideal gas. Entropy of the universe. Principle of increase of entropy. The thermodynamic scale of temperature, its identity with the perfect gas scale. Impossibility of attaining the absolute zero, third law of thermodynamics.</p>	<p>The laws of thermodynamics : The Zeroth law, first law of thermodynamics, internal energy as a state function, reversible and irreversible change, <b><i>Carnot's cycle</i></b>, carnot theorem and the second law of thermodynamics. Clausius theorem inequality. Entropy, Change of entropy in simple cases (i) Isothermal expansion of an ideal gas (ii) Reversible isochoric process (iii) Free adiabatic expansion of an ideal gas. <b><i>Concept of entropy, Entropy of the universe. Entropy change in reversible and irreversible processes, Entropy of Ideal gas, Entropy as a thermodynamic variable, S-T diagram,</i></b> Principle of increase of entropy. The thermodynamic scale of temperature, <b><i>Third law of thermodynamics, Concept of negative temperature.</i></b></p>	<p>Some relevant topics are introduced.</p>
II	<p>Thermodynamic relationships: Thermodynamic variables, extensive and intensive, Maxwell's general relationships, application to Joule-Thomson cooling and adiabatic cooling in a general system, Van der Waals gas, Clausius-Clapeyron heat equation. Thermodynamic potentials and equilibrium of thermodynamical systems, relation with thermodynamical variables. Cooling due to adiabatic demagnetization, production and measurement of very low temperatures. Blackbody radiation : Pure temperature dependence, Stefan-Boltzmann law, pressure of radiation, Special distribution of BB radiation, Wien's displacement law, Rayleigh-Jean's law, the ultraviolet catastrophe, Planck's quantum postulates, Planck's law, complete fit with</p>	<p><b><i>Thermodynamic functions, Internal energy, Enthalpy, Helmholtz function and Gibb's free energy, Maxwell's thermodynamical equations and their applications, TdS equations, Energy and heat capacity equations Application of Maxwell's equation in Joule-Thomson cooling,</i></b> adiabatic cooling of a system, Van der Waals gas, Clausius-Clapeyron heat equation. Blackbody spectrum, Stefan-Boltzmann law, Wien's displacement law, Rayleigh-Jean's law, Planck's quantum theory of radiation.</p>	<p>Unit is restructured for clarity</p>



	experiment.		
III	Maxwellian distribution of speeds in an ideal gas: Distribution of speeds and of velocities, experimental verification, distinction between mean, rms and most probable speed values. Doppler broadening of spectral lines. Transport phenomena in gases: Molecular collisions, mean free path and collision cross sections. Estimates of molecular diameter and mean free path. Transport of mass, momentum and energy and interrelationship, dependence on temperature and pressure. Liquifaction of gases: Boyle temperature and inversion temperature. Principle of regenerative cooling and of cascade cooling, liquifaction of hydrogen and helium. Refrigeration cycles, meaning of efficiency.	Maxwellian distribution of speeds in an ideal gas: Distribution of speeds and of velocities, experimental verification, distinction between mean, rms and most probable speed values. Doppler broadening of spectral lines. Transport phenomena in gases: Molecular collisions mean free path and collision cross sections. Estimates of molecular diameter and mean free path. Transport of mass, momentum and energy and interrelationship, dependence on temperature and pressure. <b>Behavior of Real Gases: Deviations from the Ideal Gas Equation. The Virial Equation. Andrew's Experiments on CO<sub>2</sub> Gas. Critical Constants.</b>	<b>This Unit is upgraded to cover Ideal and Real Gases.</b>
IV	The statistical basis of thermodynamics: Probability and thermodynamic probability, principle of equal a priori probabilities, statistical postulates. Concept of Gibb's ensemble, accessible and inaccessible states. Concept of phase space, canonical phase space, Gamma phase space and $\mu$ phase space. Equilibrium before two systems in thermal contact, probability and entropy, Boltzmann entropy relation. Boltzmann canonical distribution law and its applications, law of equipartition of energy. Transition to quantum statistics: 'h' as a natural constant and its implications, cases of particle in a one-dimensional box and one-dimensional harmonic oscillator.	The statistical basis of thermodynamics: Probability and thermodynamic probability, principle of equal a priori probabilities, statistical postulates. Concept of Gibb's ensemble, accessible and inaccessible states. Concept of phase space, canonical phase space, Gamma phase space and $\mu$ phase space. Equilibrium before two systems in thermal contact, probability and entropy, Boltzmann entropy relation. Boltzmann canonical distribution law and its applications, law of equipartition of energy. Transition to quantum statistics: 'h' as a natural constant and its implications, cases of particle in a one-dimensional box and one-dimensional harmonic oscillator.	<b>No change required</b>
V	Indistinguishability of particles and its consequences, Bose-Einstein & Fermi-Dirac conditions, Concept of partition function, Derivation of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac Statistics Through Canonical partition function. Limits of B.E. and F-D statistics to M-B statistics. Application of BE statistics to black body	Indistinguishability of particles and its consequences, Bose-Einstein & Fermi-Dirac conditions, Concept of partition function, Derivation of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac Statistics, Limits of B-E and F-D statistics to M-B statistics. Application of B-E statistics to black body radiation, Application of F-D statistics to free electrons in a metal.	<b>No change required</b>

**TEXT AND REFERENCE BOOKS :**

1. B.B. Laud, "Introduction to Statistical Mechanics" (Macmillan 1981)
2. F. Reif: "Statistical Physics" (Mcgraw-Hill, 1998).
3. K. Haug : "Statistical Physics" (Wiley Eastern, 1988).
4. Thermal and statistical Physics : R.K. Singh, Y.M. Gupta and S. Sivraman
5. Physics (Part-2) : Editor, Prof : B.P. Chandra, M.P. Hindi Granth Academy.
6. Heat and Thermodynamics: K.W. Zeemansky.
7. Thermal Physics: B.K. Agarwal.
8. Heat and Thermodynamics: Brij Lal and N. Subramanyam.
9. Heat and Thermodynamics: Dayal, Verma and Pandey.
10. A Treatise on Heat: M.N. Saha and B.N. Srivastava.

Subject: Physics

Paper-II: WAVES, ACOUSTICS AND OPTICS

UNIT	Current Course	New Proposed Course	Justification
I	Waves in media: Speed of transverse waves on a uniform string, speed of longitudinal waves in a fluid, energy density and energy transmission in waves, typical measurements. Waves over liquid surface: gravity waves and ripples. Group velocity and phase velocity, their measurements. Harmonics and the quality of sound; examples. Production and detection of ultrasonic and infrasonic waves and applications. Reflection, refraction and diffraction of sound : Acoustic impedance of a medium, percentage reflection & refraction at a boundary, impedance matching for transducers, diffraction of sound, principle of a sonar system, sound ranging.	Waves in media: Speed of transverse waves on uniform string, speed of longitudinal waves in a fluid, energy density and energy transmission in waves. Waves over liquid surface: gravity waves and ripples. Group velocity and phase velocity and relationship between them. Production and detection of ultrasonic and infrasonic waves and applications. Reflection, refraction and diffraction of sound : Acoustic impedance of a medium, percentage reflection & refraction at a boundary, impedance matching for transducers, diffraction of sound, principle of a sonar system, sound ranging.	<b>The change in Unit is due to repetition of topics already covered in detail in 12th syllabus</b>
II	Fermat's Principle of extremum path, the aplanatic points of a sphere and other applications. Cardinal points of an optical system, thick lens and lens combinations. Lagrange equation of magnification, telescopic combinations, telephoto lenses. Monochromatic aberrations and their reductions; aspherical mirrors and Schmidt corrector plates, aplanatic points, oil immersion objectives, meniscus lens. Optical instruments: Entrance and exit pupils, need for a multiple lens eyepiece, common types of eyepieces. (Ramsdon and Hygen's eyepieces)	Fermat's Principle of extremum path, the aplanatic points of a sphere and other applications. Cardinal points of an optical system, thick lens and lens combinations. Lagrange equation of magnification, telescopic combinations, telephoto lenses. Monochromatic aberrations and their reductions; aspherical mirrors and Schmidt corrector plates, aplanatic points, oil immersion objectives, meniscus lens. Optical instruments: Entrance and exit pupils, need for a multiple lens eyepiece, common types of eyepieces. (Ramsdon and Hygen's eyepieces)	<b>No change</b>
III	Interference of light: The principle of superpositions, two slit interference, coherence	Interference of light: The principle of superpositions, two slit interference, coherence requirement for the	<b>Unit is rearranged according to</b>

	<p>requirement for the sources, optical path retardations, lateral shift of fringes, Rayleigh refractometer Localised fringes; thin films. Hadinger fringes: fringes of equal indination. Michelson interferometer, its application for precision defermination of wavelength, wavelength difference and the width of spectral lines, Twymann. Green interferometer and its uses, intensify distribution in multiple beam interference. Tolansky fringes, Fabry-Perot interferometer and etalon.</p>	<p>sources, optical path retardations, <b><u>Conditions for sustained interference, Theory of interference, Thin films. Newton's rings and Michelson interferometer and their applications its application for precision determinations of wavelength, wavelength difference and the width of spectral lines. Multiple beam interference in parallel film and Fabry-Perot interferometer.</u></b> Rayleigh refractometer, Twymann. Green interferometer and its uses.</p>	<p>relevant topics.</p>
IV	<p>Fresnel half-period zones, plates, straight edge, rectilinear propagation, Fraunhefer diffraction : Diffraction at a slit, half-period zones, phasor diagram and integral calculus methods, the intensity distribution, diffraction at a circular aperture and a circular disc, resolution of images, Rayleigh criterion, resolving power of telescope and microscopic systems. Diffraction gratings : Diffraction at N parallel slits, intensity distribution, plane diffraction grating, reflection grating and blazed gratings, Concave grating and different mountings, resolving power of a grating and comparison with resolving powers of prism and of a Fabry-Perot etalon. Double refraction and optical rotation : Refraction in uniaxial crystals, Phase retardation plates, double image prism. Rotation of plane of polarisation, origin of optical rotation in liquids and in crystals.</p>	<p><b><u>Diffraction, Types of Diffraction, Fresnel's diffraction, half-period zones, phasor diagram and integral calculus methods, the intensity distribution, Zone plates, diffraction due to straight edge, Fraunhefer diffraction due to a single slit and double slit, Diffraction at N-Parallel slit, Plane Diffraction grating,</u></b> Rayleigh criterion, resolving power of grating , Prism, telescope. <b><u>Polarized light and its mathematical representation, Production of polarized light by reflection, refraction and scattering. Polarization by double refraction and Huygen's theory, Nicol prism, Retardation plates, Production and analysis of circularly and elliptically polarized light. Optical activity and Fresnel's theory, Biquartz polarimeter.</u></b></p>	<p>Unit is modified and rearranged according to relevant topics.</p>
V	<p>Laser system : Purity of a spectral line, coherence length and coherence time, spatial coherence of a source, Einstein's A and B coefficients, Spontaneous and induced emissions, conditions for laser action, population inversion, Types of Laser : Ruby</p>	<p>Laser system: <b><u>Basic properties of Lasers, coherence length and coherence time, spatial coherence of a source,</u></b> Einstein's A and B coefficients, Spontaneous and induced emissions, conditions for laser action, population inversion, Types of Laser : Ruby and, He-Ne laser and. Applications of laser : Application in</p>	<p>No change required</p>

and, He-Ne and Semiconductor lasers. Application of lasers : Application in communication, Holography and non linear optics. (Polarization P including higher order terms in E and generation of harmonics).	communication, Holography and Basics of non linear optics and Generation of Harmonic.	
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**TEXT AND REFERENCE BOOKS :**

1. A.K. Ghatak, 'Physical Optics'
2. D.P. Khandelwal, 'Optical and Atomic Physics' (Himalaya Publishing House, Bombay, 1988)
3. K.D. Moltev ; 'Optics' (Oxford University Press)
4. Sears : 'Optics'
5. Jenkins and White : 'Fundamental of Optics' (McGraw-Hill)
6. B.B. Laud : Lasers and Non-linear Optics (Wiley Eastern 1985)
7. Smith and Thomson : 'Optics' (John Wiley and Sons)
8. Berkely Physics Courses : Vol.-III, 'Waves and Oscilations'
9. I.G. Main, 'Vibratiens and Waves' (Cambridge University Press)
10. H.J. Pain : 'The Physics of Vibrations and Waves' (MacMillan 1975)
11. Text Book of Optics : B.K. Mathur
12. B.Sc. (Part III) Physics : Editor : B.P. Chandra, M.P. Hindi Granth Academy.
13. F. Smith and J.H. Thomson, Manchester Physics series : optics (English language boosoeiety and Jehu wiley, 1577)
14. Bern and Woif : 'Opties'.
15. Physical Optics: B. K. Mathur and T. P. Pandya.
16. A textbook of Optics: N. Subrahmanyam, Brijlal and M. N. Avadhanulu.
17. Geometrical and Physical Optics: Longhurst.
18. Introduction to Modern Optics: G. R. Fowels.
19. Optics: P. K. Srivastav

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# 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:

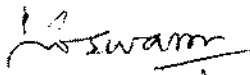
1. There shall be 2 theory papers of 3 hours duration each and one practical paper of 4 hours duration. Each paper shall carry 50 marks.
2. Numerical problems of at least 30% will compulsorily be asked in each theory paper.
3. In practical paper, each student has to perform two experiments one from each 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:

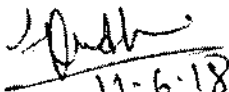
Experiment	: 15+15=30
Viva voce	: 10
Internal assessment	: 10

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.


  
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**B.Sc. Part-II**

**Paper-I**

**THERMODYNAMICS, KINETIC THEORY AND STATISTICAL PHYSICS**

**Unit-1** The laws of thermodynamics : The Zeroth law, first law of thermodynamics, internal energy as a state function, reversible and irreversible change, Carnot's cycle, Carnot theorem, second law of thermodynamics. Clausius theorem inequality. Entropy, Change of entropy in simple cases (i) Isothermal expansion of an ideal gas (ii) Reversible isochoric process (iii) Free adiabatic expansion of an ideal gas. Concept of entropy, Entropy of the universe. Entropy change in reversible and irreversible processes, Entropy of Ideal gas, Entropy as a thermodynamic variable, S-T diagram, Principle of increase of entropy. The thermodynamic scale of temperature, Third law of thermodynamics, Concept of negative temperature.

**Unit-2** Thermodynamic functions, Internal energy, Enthalpy, Helmholtz function and Gibb's free energy, Maxwell's thermodynamical equations and their applications, TdS equations, Energy and heat capacity equations Application of Maxwell's equation in Joule-Thomson cooling, adiabatic cooling of a system, Van der Waals gas, Clausius-Clapeyron heat equation. Blackbody spectrum, Stefan-Boltzmann law, Wien's displacement law, Rayleigh-Jean's law, Planck's quantum theory of radiation.

**Unit-3** Maxwellian distribution of speeds in an ideal gas: Distribution of speeds and velocities, experimental verification, distinction between mean, rms and most probable speed values. Doppler broadening of spectral lines. Transport phenomena in gases: Molecular collisions mean free path and collision cross sections. Estimates of molecular diameter and mean free path. Transport of mass, momentum and energy and interrelationship, dependence on temperature and pressure.

Behaviour of Real Gases: Deviations from the Ideal Gas Equation. The Virial Equation. Andrew's Experiments on CO<sub>2</sub> Gas. Critical Constants.

**Unit-4** The statistical basis of thermodynamics: Probability and thermodynamic probability, principle of equal a priori probabilities, statistical postulates. Concept of Gibb's ensemble, accessible and inaccessible states. Concept of phase space,  $\gamma$  phase space and  $\mu$  phase space. Equilibrium before two systems in thermal contact, probability and entropy, Boltzmann entropy relation. Boltzmann canonical distribution law and its applications, law of equipartition of energy.

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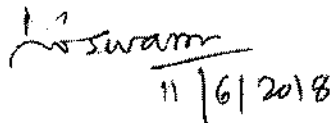
Transition to quantum statistics: 'h' as a natural constant and its implications, cases of particle in a one-dimensional box and one-dimensional harmonic oscillator.

**Unit-5** Indistinguishability of particles and its consequences, Bose-Einstein & Fermi-Dirac conditions, Concept of partition function, Derivation of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac Statistics, Limits of B-E and F-D statistics to M-B statistics. Application of B-E statistics to black body radiation, Application of F-D statistics to free electrons in a metal.

**TEXT AND REFERENCE BOOKS:**

1. B.B. Laud, "Introduction to Statistical Mechanics" (Mcmillan 1981)
2. F. Reif : "Statistical Physics" (Mcgraw-Hill, 1998).
3. K, Haug : "Statatistical Physics" (Wiley Eastern, 1988).
4. Thermal and statistical Physics: R.K. Singh, Y.M. Gupta and S. Sivraman.
5. Statistical Physics: Berkeley Physics Course, Vol. 5
6. Physics (Part-2): Editor, Prof. B.P. Chandra, M.P. Hindi Granth Academy.
7. Heat and Thermodynamics: K.W. Zeemansky.
8. Thermal Physics: B.K. Agarwal.
9. Heat and Thermodynamics: Brij Lal and N. Subramanyam.
10. Heat and Thermodynamics: Dayal, Verma and Pandey.
11. A Treatise on Heat: M.N. Saha and B.N. Srivastava.

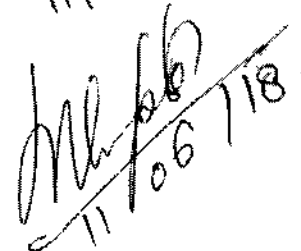
  
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**Paper-II**  
**WAVES, ACOUSTICS AND OPTICS**

**Unit-1** Waves in media: Speed of transverse waves on uniform string, speed of longitudinal waves in a fluid, energy density and energy transmission in waves. Waves over liquid surface: gravity waves and ripples. Group velocity and phase velocity and relationship between them. Production and detection of ultrasonic and infrasonic waves and applications.

Reflection, refraction and diffraction of sound : Acoustic impedance of a medium, percentage reflection & refraction at a boundary, impedance matching for transducers, diffraction of sound, principle of a sonar system, sound ranging.

**Unit-2** Fermat's Principle of extremum path, the aplanatic points of a sphere and other applications. Cardinal points of an optical system, thick lens and lens combinations. Lagrange equation of magnification, telescopic combinations, telephoto lenses. Monochromatic aberrations and their reductions; aspherical mirrors and Schmidt corrector plates, aplanatic points, oil immersion objectives, meniscus lens.

Optical instruments: Entrance and exit pupils, need for a multiple lens eyepiece, common types of eyepieces. (Ramsdon and Hygen's eyepieces).

**Unit-3** Interference of light: The principle of superpositions, two slit interference, coherence requirement for the sources, optical path retardations, Conditions for sustained interference, Theory of interference, Thin films. Newton's rings and Michelson interferometer and their applications its application for precision determinations of wavelength, wavelength difference and the width of spectral lines. Multiple beam interference in parallel film and Fabry-Perot interferometer. Rayleigh refractometer, Twyman-Green interferometer and its uses.

**Unit-4** Diffraction, Types of Diffraction, Fresnel's diffraction, half-period zones, phasor diagram and integral calculus methods, the intensity distribution, Zone plates, diffraction due to straight edge, Fraunhofer diffraction due to a single slit and double slit, Diffraction at N-Parallel slit, Plane Diffraction grating, Rayleigh criterion, resolving power of grating , Prism, telescope.

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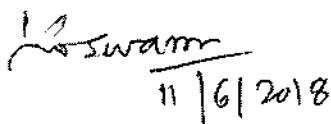
Polarized light and its mathematical representation, Production of polarized light by reflection, refraction and scattering. Polarization by double refraction and Huygen's theory, Nicol prism, Retardation plates, Production and analysis of circularly and elliptically polarized light. Optical activity and Fresnel's theory, Biquartz polarimeter.

**Unit-5** Laser system: Basic properties of Lasers, coherence length and coherence time, spatial coherence of a source, Einstein's A and B coefficients, Spontaneous and induced emissions, conditions for laser action, population inversion, Types of Laser : Ruby and He-Ne laser and. Applications of laser : Application in communication, Holography and Basics of non linear optics and Generation of Harmonic.

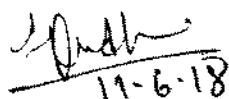
**TEXT AND REFERENCE BOOKS:**

1. A.K. Ghatak, 'Physical Optics'
2. D.P. Khandelwal, 'Optical and Atomic Physics' (Himalaya Publishing House, Bombay, 1988)
3. K.D. Moltev; 'Optics' (Oxford University Press)
4. Sears: 'Optics'
5. Jenkins and White: 'Fundamental of Optics' (McGraw-Hill)
6. B.B. Laud: Lasers and Non-linear Optics (Wiley Eastern 1985)
7. Smith and Thomson: 'Optics' (John Wiley and Sons)
8. Berkely Physics Courses: Vol.-III, 'Waves and Oscillations'
9. I.G. Main, 'Vibrations and Waves' (Cambridge University Press)
10. H.J. Pain: 'The Physics of Vibrations and Waves' (MacMillan 1975)
11. Text Book of Optics: B.K. Mathur
12. B.Sc. (Part III) Physics: Editor: B.P. Chandra, M.P. Hindi Granth Academy.
13. F. Smith and J.H. Thomson, Manchester Physics series: optics (John wiley, 1971)
14. Born and Wolf : 'Optics'.
15. Physical Optics: B. K. Mathur and T. P. Pandya.
16. A textbook of Optics: N. Subrahmanyam, Brijlal and M. N. Avadhanulu.
17. Geometrical and Physical Optics: Longhurst.
18. Introduction to Modern Optics: G. R. Fowels.
19. Optics: P. K. Srivastav.

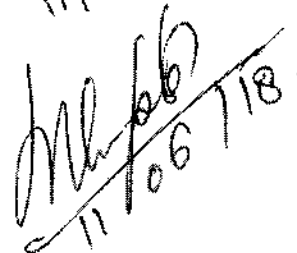
  
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## PRACTICALS

### Minimum 16 (Eight from each group)

Experiments out of the following or similar experiments of equal standard

1. Study of Brownian motion.
2. Study of adiabatic expansion of a gas.
3. Study of conversion of mechanical energy into heat.
4. Heating efficiency of electrical kettle with varying voltage.
5. Study of temperature dependence of total radiation.
6. Study of temperature dependence of spectral density of radiation.
7. Resistance thermometry.
8. Thermo emf thermometry.
9. Conduction of heat through poor conductors of different geometries.
10. Experimental study of probability distribution for a two-option system using a coloured dice.
11. Study of statistical distribution on nuclear disintegration data (GM counter used as a black box).
12. Speed of waves on a stretched strings.
13. Studies on torsional waves in a lumped system.
14. Study of interference with two coherent source of sound.
15. Chlandi's figures with varying excitation and loading points.
16. Measurements of sound intensities with different situations.
17. Characteristics of a microphone-loudspeakers system
18. Designing an optical viewing system.
19. Study of monochromatic defects of images.
20. Determining the principle point of a combination of lenses.
21. Study of interference of light (biprism or wedge film).
22. Study of diffraction at a straight edge or a single slit.
23. Study of F-P etalon fringes.
24. Study of diffraction grating and its resolving power.
25. Resolving power of telescope system.
26. Polarization of light by reflection; also cos-squared law.
27. Study of optical rotation for any system.
28. Study of laser as a monochromatic coherent source.
29. Study of a divergence of laser beam.
30. Calculation of days between two dates of a year.
31. To check if triangle exists and the type of a triangles.
32. To find the sum of the sine and cosines series and print out the curve.

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33. To solve simultaneous equation by elimination method.
34. To prepare a mark-list of polynomials.
35. Fitting a straight line or a simple curve
36. Convert a given integer into binary and octal systems and vice versa .
37. Inverse of a matrix.
38. Spiral array.

#### TEXT AND REFERENCE BOOKS

1. D.P. Khandelwal, Optics and Atomic physics (Himalaya Publishing house, Bombay 1988).
2. D.P. Khandelwal, A Laboratory Manual for Undergraduate Classes (Vani Publishing House, New Delhi).
3. S. Lipschutz and a Poe, Schaum's outline of theory and Problems of Programming with Fortran(McGraw-hill Book Company 1986).
4. C Dixon, Numerical Analysis .

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## **B.Sc.–II (BOTANY) PAPER-I**

### **(PLANT TAXONOMY, ECONOMIC BOTANY, PLANT ANATOMY AND EMBRYOLOGY)**

#### **UNIT-I**

Bentham and Hooker system of classification. Binomial Nomenclature, International Code of Nomenclature for Algae, Fungi, and plants (IUCN), Typification, numerical Taxonomy and chemotaxonomy. Preservation of Plant material and Herbarium techniques. Important botanical gardens and herbaria of India, Kew Botanical garden, England.

#### **UNIT-II**

Systematic position, distinguishing characters and economic importance of the following families, Ranunculaceae, Magnoliaceae, Brassicaceae, Rosaceae, Papaveraceae, Caryophyllaceae, Rutaceae, Cucurbitaceae, Apiaceae, Rubiaceae, Apocynaceae, Asclepiadaceae, Solanaceae, Malvaceae, Convolvulaceae, Orchidaceae, Acanthaceae, verbenaceae, Lamiaceae, Asteraceae, Fabaceae, Euphorbiaceae, Poaceae and Liliaceae.

#### **UNIT-III**

Economic Botany: Botanical name, family, part used and uses of the following economically important plants, fiber yielding plants; Cotton, jute, sun, hemp, coir. Timber yielding plants: Sal, Teak, Shisham and Pine. Medicinal plants: Kalmegh, Ashwangandha, Ghritkumari, Giloy, Brahmi, sarpagandha, ---of medicinal plants of C.G. Food plants: Pearl millet, Buck of wheat, Sorghum, Soyabean, gram, Ground nut, Sugarcane and Potato. Fruit plants: Pear, Peach, Litchi. Spices: Cinnamon, Turmeric, Ginger, Asafoetida and Cumin. Beverages : Tea, Coffee Rubber Cultivation of important flowers: Chrysanthemum, Dahelia, Biodiesel plants Jatropha, Pongamia Ethnobotany in context of Chhattisgarh.

#### **UNIT-IV**

Plant Anatomy: Root and shoot apical meristems theories of root and shoot apex organization, permanent tissues, anatomy of root, stem and leaf of dicot and monocot, secondary growth in root and stem, Anatomical anomalies in the primary structure of stems (Nyctanthes, Boerhaavia, Casuarina), Anamolous secondary growth in Dracaena, Bignonia, Laptadenia.

#### **UNIT-V**

Embryology: Flower as a reproductive organ, anther, microsporogenesis, types of ovules, megasporogenesis, development of male and female gametophyte, pollination, mechanisms, self incompatibility, fertilization, endosperm, embryo, polyembryonoy, apomixes and parthenocarpy.

#### **Books Recommended:**

Singh, Pandey, Jain. *Diversity and Systematics of Seed Plants*, Rastogi Publications Merrut

Sharma OP, *Plant Taxonomy*, Tata Mc Graw Hill, New Delhi

Pandey BP, *Taxonomy of Angiosperms*, S. Chand Publishing, New Delhi

Pandey, BP, *Plant Anatomy*, S.Chand Publishing, New Delhi

Pandey, BP, *Economic Botany*, S.Chand Publishing, New Delhi

Bhojwani, SS and Bhatanagar SP, *Embryology of Angiosperm*, Vikas Publication House, New Delhi

Singh, Pandey, Jain, *Embryology of Angiosperms*, Rastogi Publication, Meerut

Sharma, V, Alum, A. *Ethnobotany*, Rastogi Publications, Meerut

Tayal, MS *Plant Anatomy*, Rastogi Publication, Meerut

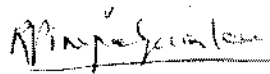


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Govt. Bilasa Girls College, Bilaspur



(Mr. Shivakant Mishra)

(Mr. Sudheer Tiwari)

**B.Sc.-II (BOTANY) PAPER-II**  
**(ECOLOGY AND PLANT PHYSIOLOGY)**

**UNIT-I**

Introduction and scope of ecology, environmental and ecological factors, Soil formation and soil profile, Liebig's law of minimum, Shelford's law of tolerance, morphological and anatomical adaptations in hydrophytes, xerophytes and epiphytes.

**UNIT-II**

Population and community characteristics, Raunkiaer's life forms, population interactions (e.g. Symbiosis, Amensalism etc.), succession, ecotone and edge effect, ecological niches, ecotypes, ecads, keystone species

Concept of ecosystem, trophic levels, flow of energy in ecosystem, food chain and food web, concept of ecological pyramids

Biogeochemical cycles: carbon cycle, nitrogen cycle and phosphorus cycle

**UNIT-III**

Plant water relations: Diffusion, permeability, osmosis, imbibitions, plasmolysis, osmotic potential and water potential, Types of soil water, water holding capacity, wilting, Absorption of water, theories of Ascent of sap, Mineral nutrition and absorption, Deficiency symptoms, Transpiration, stomatal movement, significance of transpiration, Factors affecting transpiration, guttation.

**UNIT-IV**

Photosynthesis: Photosynthetic apparatus and pigments, light reaction mechanism of ATP synthesis. C<sub>3</sub>, C<sub>4</sub> CAM pathway of carbon reduction, photorespiration, factors affecting photosynthesis.

Respiration: Aerobic and anaerobic respiration, Glycolysis, Krebs's cycle, factors affecting respiration, R.Q.

**UNIT-V**

Plant growth hormones: Auxin, Gibberellin, Cytokinin, Ethylene and Abscissic acid. Physiology of flowering, Florigen concept, Photoperiodism and Vernalization. Seed dormancy and germination, plant movement.

**Books Recommended:**

Koromondy, E.J. *Concepts of Ecology*, Prentice Hall, USA

Singh, JS Singh SP and Gupta SR. *Ecology and Environmental Science and Conservation*, S. Chand Publishing, New Delhi

Sharma, PD. *Ecology and Environment*, Rastogi Publications, Meerut

Hopkins, WG and Huner, PA. *Introduction to Plant Physiology*, John Wiley and Sons.

Pandey SN and Sinha BK, *Plant Physiology*, Vikas Publishing, New Delhi

Taiz, L and Zeiger. E. *Plant Physiology*, 5<sup>th</sup> edition, Sinauer Associates Inc. M.A, USA

Srivastava, HS *Plant Physiology and Biotechnology*, Rastogi Publications, Meerut

## **B.Sc. II (BOTANY)**

### **Practical**

1. Taxonomy: Detailed description and identification of locally available plants of the families as prescribed in the theory paper.
2. Economic Botany: Identification and comment on the plants and plant products belonging to different economic use categories
3. Preparation of Herbarium of local wild plants.
4. Quantitative vegetation analysis of a grassland ecosystem.
5. Anatomical characteristics of hydrophytes and xerophytes.
6. Demonstration of root pressure.
7. Demonstration of transpiration.
8. Demonstration of evolution of O<sub>2</sub> in photosynthesis, factors affecting of photosynthesis.
9. Comparison of R.Q. of different respiratory substrates.
10. Demonstration of fermentation.
11. Determination of BOD of a water body.
12. Demonstration of mitosis.



## PRACTICAL SCHEME

TIME: 4 Hrs.

M.M. : 50

1.	Anatomy	08
2.	Economic Botany	04
3.	Physiology	08
4.	Ecology	10
5.	Spotting	10
6.	Viva-Voce	05
7.	Project Work/ Field Study	10

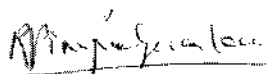


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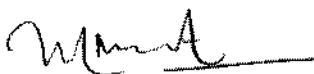
Govt. VYTPG Science College

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(Mrs. Sanchal Moghe)

Govt. Bilasa Girls College, Bilaspur



(Mr. Shivakant Mishra)

(Mr. Sudheer Tiwari)

# MICROBIOLOGY

## BSc-2<sup>nd</sup>

### Paper- I: Molecular Biology and Genetic Engineering

#### UNIT-1: FUNDAMENTALS OF MOLECULAR BIOLOGY

History and scope of molecular biology, concept and mechanism of heredity. DNA as genetic material- experimental evidences. DNA replication- mechanism, process and enzymes/proteins involved in replication.

#### UNIT-2: CENTRAL DOGMA OF PROTEIN SYNTHESIS

Transcription- initiation, elongation, termination, RNA polymerases and sigma factor. Transcription inhibitors (antibiotics, drugs). Translation- initiation, elongation and termination. Factors involved in translation. Genetic code.

#### UNIT-3: MUTATION AND DNA REPAIR MECHANISM

Introduction and Types of Gene mutations- Base substitution, frame shift mutation (insertion, deletion, miss-sense, nonsense mutation.) mutagens – physical and chemical. Reverse mutation in bacteria. DNA repair mechanism (mismatch repair, photo-reactivation, excision and SOS repair). Beneficial and harmful effect of mutation.

#### UNIT-4: GENE REGULATION

Concept of gene- Cistron, Recon, Muton. Operon Concept- lac Operon, tryptophan Operon, His Operon. Activator, Co-activator and Repressor. Introduction to Bioinformatics- Elementary genome Database.

#### UNIT-5: GENETIC ENGINEERING

Basic concept of Genetic Engineering, DNA modifying enzymes Restriction endonuclease, DNA ligase, terminal transferase. Vectors- pBR322, pUC19, BAC and YAC. Phage based vectors, expression of vector. Transformation – physical and chemical method. Bacterial Host. Screening of recombinant vector Blue white Screening, Colony Hybridization.

### Text Books Recommended:

1. Gene Cloning by T.A. Brown.
2. General Microbiology by Power and Daganwala.
3. Zinssers Microbiology by KJ Wolfgang, McGraw- Hill Company.
4. Microbial Genetics by RM Stanley, F David and EC John.
5. Bacteriological Techniques by FJ Baker.
6. Molecular Biology of the Cell; 3rd Edition; Bruce Alberts ,et.al; Garland Publishing.
7. Cell biology; C.B. Powar; Himalaya Publishing House; Fifth edition
8. Cell & Molecular Biology; Gerald Karp; Fourth edition
9. A Textbook of Microbiology; Dubey&Maheshwari; S.chand& Sons.
10. Cell biology & Genetics; P. K. Gupta
11. Introduction to Bioinformatics; T K Atwood and D J Parry-Smith; Pearson Education Ltd

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**Paper- II: Bioinstrumentation and Biostatistics****UNIT-1: MICROSCOPY AND CENTRIFUGATION**

Simple and compound light microscope, Bright field, Dark field, Phase contrast and Electron microscope. Centrifugation- principle and types of centrifuges (analytical and preparatory), types of centrifugation- differential and rate zonal centrifugation.

**UNIT-2: pH metry and chromatography**

Principle of pH meter, types of electrodes, factors affecting pH measurements, and application of pH meter. Chromatography- principle, types- paper, TLC and column chromatography, HPLC.

**UNIT-3: SPECTROPHOTOMETRY**

Electromagnetic spectrum, Beers-Lamberts law, Types (Principles, working and application)- colorimeter, UV - Vis Spectrophotometry and IR- Spectrophotometry, Turbidometry.

**UNIT-4: Electrophoresis and X-Ray Diffraction**

Principle of electrophoresis, instrumentation and Application, types of Paper, Gel electrophoresis and Immunoelectrophoresis. X-ray diffraction- principle and application.

**UNIT-5: Biostatistics**

Data- Types, characteristics, presentation and distribution. Data analysis- central tendency (Mean, Median and Mode), Deviation (variance SD and SE). Concept of probability.

***Text Books Recommended:***

1. Introduction to Instrumental analysis by Robert Braun.
2. Instrumental Techniques by Upadhyay and Upadhyay.
3. Instrumental Methods of Chemical Analysis by BK Sharma.
4. Bio statistics; Sunder Rao
5. Statistical Methods; S. P. Gupta; Sultan Chand & Sons

Sultana

Phanoli

Shikha

Donal Subbar

Amritha

**PRACTICAL****M. M. 50**

Determination of antibiotic resistance by plating method.  
 Assaying of microbial enzymes; Catalase, Proteases, Peroxidases,  
 Cellulase, Cellobioases, Amylase, Diastase.  
 Exercise on paper, thin layer, column chromatography.  
 Exercise on paper and gel electrophoresis.  
 determination of pH of various water and soil sample.  
 testing of lambert beer's law.  
 Determination of lamda max of dye by spectrophotometer  
 Isolation of resistant bacteria from soil and water sample

**Scheme of Practical Examination**

Time - 4 hours

M.M. 50

1. Exercise on spectrophotometer/ pH meter	10
2. Exercise on chromatography	10
3. Exercise on genetics	05
4. Spotting (1-5)	10
5. Viva-Voce	05
6. Sessional	10

Total 50

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ZellanaChandSPDevikaAmir

**Zoology**  
**B.Sc. Part – II 2018-19**  
**Paper – I**  
**(Anatomy and Physiology)**

Comparative Anatomy of various organ systems of vertebrates:

**Unit: I**

- Integument and its derivatives: structure of scales, hair and feathers
- Alimentary canal and digestive glands in vertebrates
- Respiratory organs : Gills and lung , air-sac in birds

**Unit: II**

- Endoskeleton: (a) Axial Skeleton- Skull and Vertebrae, (b) Appendicular Skeleton  
Limbs and girdles
- Circulatory System: Evolution of heart and aortic arches
- Urinogenital System: Kidney and excretory ducts

**Unit: III**

- Nervous System: General plan of brain and spinal cord
- Ear and Eye: structure and function
- Gonads and genital ducts

**Unit: IV**

- Digestion and absorption of dietary components
- Physiology of heart, cardiac cycle and ECG
- Blood Coagulation
- Respiration: mechanism and control of breathing

**Unit: V**

- Excretion: Physiology of excretion, osmoregulation
- Physiology of muscle contraction
- Physiology of nerve impulse, Synaptic transmission

**Zoology**  
**B.Sc. Part II 2018-19**  
**Practical**

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

- Study of the representative examples of the different chordates (Classified characters).
- Dissection of various systems of scoliodon-Afferent and Efferent branchial cranial nerves, internal ear.

**Alternative methods: By Clay/Thermacol/ Drawing/ Model etc.)**

- Simple microscopic technique through unstained or stained permanent mount.
- Study of prepared slides histological, as per theory papers.
- Study of limb girdles and vertebrae of Frog, Varanus, Fowl and Rabbit.
- Identification of species and individual of honey bee.
- Life cycle of honey bee and silkworm.
- Exercise based on Evolution and Animal behavior.

**Scheme of Practical Exam**

**Time: 3:30hrs**

• Major dissection (Cranial nerves/efferent branchial vessel)	10
• Exercise based on evolution	05
• Exercise based on applied zoology	05
• Exercise based on animal behavior	04
• Spotting-8 (slides-4,bones-2,specimen-2)	16
• Viva	05
• Sessional marks.	05

**Zoology**  
**B.Sc. Part – II 2018-19**  
**Paper – I**  
**(Anatomy and Physiology)**

Comparative Anatomy of various organ systems of vertebrates:

**Unit: I**

- Integument and its derivatives: structure of scales, hair and feathers
- Alimentary canal and digestive glands in vertebrates
- Respiratory organs : Gills and lung , air-sac in birds

**Unit: II**

- Endoskeleton: (a) Axial Skeleton- Skull and Vertebrae, (b) Appendicular Skeleton  
Limbs and girdles
- Circulatory System: Evolution of heart and aortic arches
- Urinogenital System: Kidney and excretory ducts

**Unit: III**

- Nervous System: General plan of brain and spinal cord
- Ear and Eye: structure and function
- Gonads and genital ducts

**Unit: IV**

- Digestion and absorption of dietary components
- Physiology of heart, cardiac cycle and ECG
- Blood Coagulation
- Respiration: mechanism and control of breathing

**Unit: V**

- Excretion: Physiology of excretion, osmoregulation
- Physiology of muscle contraction
- Physiology of nerve impulse, Synaptic transmission

- इकाई-01
- (i) मैग्मा; परिभाषा, उत्पत्ति एवं संगठन
  - (ii) बोवेन की अभिक्रिया श्रेणी, मैग्मीय विभेदन एवं स्वांगीकरण
  - (iii) तंत्र, प्रावस्था एवं घटक, उष्मागतिकी के सिद्धांत, एकघटकीय (सिलिका) द्विघटकीय ऐल्बर्ट-एनार्थाइट तथा डायोप्साइड-एनार्थाइट एवं त्रिघटकीय सिलिकेट सिस्टम डायोप्साइड-एल्बर्ट-एनार्थाइट क्रिस्टलीकरण, प्रावस्था संतुलन
  - (iv) आग्नेय शैलों का गठन, संरचनायें एवं वर्गीकरण
  - (v) आग्नेय शैलों का रूप
- इकाई-02
- (i) दिक्काल में शैल-संलग्नता, शैल-ग्रंथियों की अवधारणा
  - (ii) अम्लीय आग्नेय शैलों का शिला विवरणात्मक अध्ययन
  - (iii) क्षारीय आग्नेय शैलों का शिला-विवरणात्मक अध्ययन
  - (iv) अल्पसिलिक आग्नेय शैलों का शिलाविवरणात्मक अध्ययन
  - (v) अत्यल्पसिलिक आग्नेय शैलों का शिलाविवरणात्मक अध्ययन
- इकाई-03
- (i) अवसाद की उत्पत्ति, परिवहन एवं निक्षेपण
  - (ii) अवसाद निक्षेपण की वायूढ़, जलोढ़, तटीय, एवं गंभीर समुद्री वातावरण की गतिकी
  - (iii) अवसादी संलक्षणाओं की अवधारणा
  - (iv) डायजिनेसिस की अवधारणा
  - (v) अवसादी शैलों का गठन एवं संरचनायें
- इकाई-04
- (i) अवसादी शैलों का वर्गीकरण
  - (ii) अवसादी शैलों की शैलिकी : रूडेथियस, एरेनिथियस, केल्लेरियस अवसादी शैल
  - (iii) कायान्तरण: परिभाषा एवं कारक, संलक्षणा, कायान्तरण श्रेणी



- (iv) कायान्तरित शैलों का गठन, संरचना एवं वर्गीकरण
- (v) कायान्तरण प्रक्रियाओं की साम्य एवं असाम्य अभिक्रियायें

- इकाई-05
- (i) पैराजिनेटिक-ओरख: प्रक्षपीय विश्लेषण, ए.सी.एफ. एवं ए.के.एफ. आरेख
  - (ii) मृण्मय अवसादों का प्रगामी कायान्तरण
  - (iii) अशुद्ध चूना पत्थरों का प्रगामी-उष्मागतिक कायान्तरण
  - (iv) अल्प सिलिक शैलों का प्रगामी उष्मागतिक कायान्तरण
  - (v) भारत का शैलिकीय-प्रादेशिक विभाजन

#### प्रायोगिक कार्य-

- (1) आग्नेय, अवसादी एवं कायान्तरित शैलों के विभिन्न रूपों को रेखाचित्र की सहायता से प्रदर्शित करना।
- (2) विभिन्न आग्नेय शैलों का स्थूलदर्शी अध्ययन/सूक्ष्मदर्शी अध्ययन
- (3) विभिन्न अवसादी शैलों का स्थूलदर्शी/सूक्ष्मदर्शी अध्ययन
- (4) विभिन्न कायान्तरित शैलों का स्थूलदर्शी/सूक्ष्मदर्शी अध्ययन
- (5) भारत के शैलिकीय प्रदेशों का मानचित्र में प्रदर्शन

#### Suggested Readings:-

- |      |  |   |                                       |
|------|--|---|---------------------------------------|
| (1)  | शैलिकी के सिद्धान्त                                | - | डॉ.अंबिका प्रसाद अग्रवाल              |
| (2)  | शैलिकी के सिद्धान्त                                | - | ए.जी. झिंगरन                          |
| (3)  | Principles of petrology                            | - | G.W. Gyrrel                           |
| (4)  | Petrology  | - | H.William, F.J. Turner & E.M. Gilbert |
| (5)  | Petrology of igneous & metamorphic rocks of India- |   | S.C. Chattarjee                       |
| (6)  | A text book of sedimentary petrology               | - | Verma & Prasad                        |
| (7)  | Metamorphism & Metamorphic rocks of India-         |   | S.Ray                                 |
| (8)  | Sedimentary rocks                                  | - | F.J. Pettijhan                        |
| (9)  | Introduction of sedimentology                      | - | S.Sengupta                            |
| (10) | Sedimentary environment                            | - | H.G. Readings                         |

Class- B.Sc-II  
Paper –I  
(PETROLOGY)

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- Unit:1**
- (i) Magma, definition, origin & composition
  - (ii) Bowen's reaction series, magmatic differentiation & assimilation
  - (iii) System, phases & component, principles of thermodynamics,  
Bi-component magma: Albite-Anorthite and Diopside-Anorthite  
Tri-component magma: Diopside-Albite-Anorthite
  - (iv) Texture, structures & classification of igneous rocks
  - (v) Forms of igneous rocks
- Unit:2**
- (i) Rock association in Time & Space, concepts of rock kindreds
  - (ii) Petrographic studies of Acid igneous rocks.
  - (iii) Petrographic studies of Alkaline igneous rocks
  - (iv) Petrographic studies of Basic igneous rock
  - (v) Petrographic studies of Ultrabasic igneous rocks.
- Unit:3**
- (i) Origin, transportation & deposition of sediments
  - (ii) Dynamics of sedimentary depositional environment ; Aeolian, fluvial, coastal and abyssal environment.
  - (iii) Concepts of sedimentary facies
  - (iv) Concepts of diagenesis
  - (v) Textures & structures of sedimentary rocks.
- Unit:4**
- (i) Classification of sedimentary rocks.
  - (ii) Petrography of sedimentary rock; rudaceous, argillaceous, calcareous sedimentary rocks
  - (iii) Metamorphism; definition, agents, facies & grade
  - (iv) Textures, structures & classification of metamorphic rocks.
  - (v) Equilibrium & non-equilibrium reactions in metamorphism.

- Unit:5**
- (i) Paragenetic diagrams; projective analysis A.C.F & A.K.F. diagrams
  - (ii) Progressive metamorphism of Argillaceous rocks.
  - (iii) Progressive dynamo-thermal metamorphism of impure lime-stone.
  - (iv) Progressive dynamo-thermal metamorphism of basic igneous rocks.
  - (v) Petrographic provinces of India.

**Practical:**

- (1) Diagrammatic representation of various form & structures of igneous, sedimentary & Metamorphic rocks
- (2) Megascopic studies of various sedimentary, metamorphic & igneous rocks.
- (3) Microscopic studies of various sedimentary, metamorphic & igneous rocks.
- (4) Norm calculation
- (5) Diagrammatic representation of petrography provinces of India in outline map of India.

**Suggested Readings:-**

- (1) शैलिकी के सिद्धान्त – डॉ.अंबिका प्रसाद अग्रवाल
- (2) शैलिकी के सिद्धान्त – ए.जी. झिंगरन
- (3) Principles of petrology - G.W. Tyrell
- (4) Petrology - H.William, F.J. Turner & E.M. Gilbert
- (5) Petrology of igneous & metamorphic rocks of India- S.C. Chattarjee
- (6) A text book of sedimentary petrology - Verma & Prasad
- (7) Metamorphism & Metamorphic rocks of India- S.Ray
- (8) Sedimentary rocks - F.J. Pettijohn
- (9) Introduction of sedimentology - S.Sengupta
- (10) Sedimentary environment - H.G. Readings

कक्षा / Class- B.Sc-II  
Paper -II  
संरचनात्मक भू-विज्ञान  
(STRUCTURAL GEOLOGY)

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- इकाई-01
- (1) संरचनात्मक भूविज्ञान की परिभाषा एवं अध्ययन क्षेत्र।
  - (2) शैल दृष्यांशों का अध्ययन। दृष्यांशों पर नति तथा ढाल के प्रभाव।
  - (3) संस्तरण की पहचान। नति एवं नतिलम्ब की माप।
  - (4) क्लाइनोमीटर एवं ब्रन्टन कम्पास।
  - (5) संस्तरों के शीर्ष तथा तल की पहचान।
  - (6) शैलविरूपण की अवधारणा। प्रतिबल तथा विकृति दीर्घवृत्तज की अवधारणा।
- इकाई-02
- (1) वलन की आकारिकी।
  - (2) वलन की ज्यामितिक एवं जननिक वर्गीकरण।
  - (3) स्थलीय तथा भूवैज्ञानिक मानचित्र में वलन की पहचान।
  - (4) दृश्यांशों पर वलन के प्रभाव।
  - (5) वलन क्रियाविधि की प्राथमिक अवधारणा।
- इकाई-03
- (1) भ्रंश आकारिकी। सर्पण और सेपरेशन।
  - (2) भ्रंश का ज्यामितिक एवं जननिक वर्गीकरण।
  - (3) स्थलक्षेत्र तथा भूवैज्ञानिक मानचित्र में भ्रंश की पहचान।
  - (4) दृश्यांशों पर भ्रंश के प्रभाव।
  - (5) भ्रंशान क्रियाविधि की प्राथमिक अवधारणा।
- इकाई-04
- (1) संधि; आकारिकी, संधि का ज्यामितिक एवं जननिक वर्गीकरण।
  - (2) पत्रण की परिभाषिक शब्दावली, प्रकार, उत्पत्ति एवं विशाल संरचनाओं से संबंध।
  - (3) रेखण की परिभाषिक शब्दावली, प्रकार, उत्पत्ति एवं विशाल संरचनाओं से संबंध।
  - (4) लवण गुम्बद,

(5) प्लूटान; विवर्तनिकी एवं अभिस्थापन

इकाई-05

- (1) विषमविन्यास के प्रकार एवं पहचान।
- (2) आउटलायर तथा इनलायर, अतिव्यापन तथा अपव्यापन।
- (3) विवर्तनिकी की अवधारणा।
- (4) प्रायद्वीपीय, सिंधु गंगा के मैदान तथा प्रायद्वीपेत्तर भारत का विवर्तनिकी विन्यास।
- (5) त्रिविमीय प्रक्षेपण का भूविज्ञान में अनुप्रयोग।

**प्रायोगिक कार्य—**

- (1) प्राकृतिक संरचनात्मक प्रादर्शों का अध्ययन।
- (2) विभिन्न संरचनाओं का प्रादर्शों के माध्यम से अध्ययन।
- (3) मानचित्र में दृश्यांश को पूरा करना।
- (4) सरल से जटिल संरचनाओं को प्रदर्शित करने वाले मानचित्रों से भूवैज्ञानिक काट बनाना एवं भूवैज्ञानिक इतिहास की विवेचना करना।
- (5) संरचनाओं के अध्ययन में स्टिरियोग्राफिक प्रोजेक्शन का अनुप्रयोग।
- (6) सात दिवसीय भूवैज्ञानिक क्षेत्रीय अध्ययन

Class- B.Sc-II  
Paper –II  
(STRUCTURAL GEOLOGY)

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- Unit:1**
- (i) Definition and scope of Structural Geology. Study of outcrops. Effects of dip and slope on outcrops.
  - (ii) Identification of bedding. Dip and strike measurement.
  - (iii) Clinometer and Brunton compass.
  - (iv) Recognition of top and bottom of beds.
  - (v) Concept of rock deformation. Concept of stress and strain ellipsoids.
- Unit:2**
- (i) Fold morphology.
  - (ii) Geometric and genetic classification of folds.
  - (iii) Recognition of folds in the field and on geological maps.
  - (iv) Effect of folds on outcrops.
  - (v) Elementary idea of mechanics of folding.
- Unit:3**
- (i) Fault morphology. Slip and separation.
  - (ii) Geometric and genetic classification of faults.
  - (iii) Recognition of faults in the field and on geological maps.
  - (iv) Effect of faults on outcrops.
  - (vi) Elementary idea of mechanics of faulting.
- Unit:4**
- (i) Joint morphology; geometric and genetic classification of joints.
  - (ii) Foliation; terminology, kinds, origin and relation to major structures.
  - (iii) Lineation: terminology, Kind, origin and relation to major structures.
  - (iv) Salt domes.
  - (vii) Plutons; tectonics & emplacement.
- Unit:5**
- (i) Types and recognition of Unconformity.
  - (ii) Outlier and inlier. Overlap & offlap.

- (iii) Concept of tectonics.
- (iv) Tectonic framework of Peninsula, Indo-Gangetic Plains and Extra-Peninsular India.
- (v) Stereographic projection & its use in Structural geology.

**Practical-**

- (1) Study of Natural Structures on specimens.
- (2) Study of structures with the help of models.
- (3) Completion of outcrops.
- (4) Preparation of geological section from simple to complex geological maps and its interpretation.
- (5) Application of stereographic projection in structural geology.
- (6) Geological excursion for seven days.

**Books recommended:**

- (1) संरचनात्क भूविज्ञान – डॉ.डी.के. श्रीवास्तव
- (2) भूवैज्ञानिक संरचनाएँ – डॉ. भरत सिंह राठौर
- (3) प्रायोगिक भूविज्ञान (भाग-2) – आर.पी. मांजरेकर
- (4) Structural Geology. M.P. Billings.
- (5) Theory of Structural Geology; Gokhale, N.W. CBS
- (6) Exercises on Geological maps and dip-Strike: Gokhale, N.W. CBS.
- (7) Outlines of structural Geology. E.S. Hills.
- (8) Structural Geology- Hobbs. Means and Williams.
- (9) Geological maps- Chiplonkar and Pawar.



# **Scheme & Syllabus**

## **Subject: Electronics**

**Approved at Central Board of Studies meeting held at  
School of Studies in Electronics & Photonics  
on 11<sup>th</sup> June ,2018**

**[Constituted under Chhattisgarh Vishwavidyalaya Adhiniyam 1973 Clause 34 (A)]**

**Jointly by  
School of Studies in Electronics & Photonics  
Pt. Ravishankar Shukla University  
Raipur (C.G.)  
&  
Office of Commissioner  
Department of Higher Education  
Govt. of Chhattisgarh, Indrāvati Bhavan,  
Naya Raipur (C.G.)**



# **B. Sc. Part II**

## **ELECTRONICS**

### **Paper I**

**ELB 201 : COMMUNICATION ELECTRONICS**

**Theory:**

**Max. Marks :50**

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#### **Unit-1**

**Electronic communication:** Introduction to communication – means and modes. Need for modulation. Block diagram of an electronic communication system. Brief idea of frequency allocation for radio communication system in India (TRAI). Electromagnetic communication spectrum, band designations and usage. Channels and base-band signals. Concept of Noise, signal-to-noise (S/N) ratio.

#### **Unit-2**

**Analog Modulation:** Amplitude Modulation, modulation index and frequency spectrum. Generation of AM (Emitter Modulation), Amplitude Demodulation (diode detector), Concept of Single side band generation and detection. Frequency Modulation (FM) and Phase Modulation (PM), modulation index and frequency spectrum, equivalence between FM and PM, Generation of FM using VCO, FM detector (slope detector), Qualitative idea of Super heterodyne receiver

**Analog Pulse Modulation:** Channel capacity, Sampling theorem, Basic Principles-PAM, PWM, PPM, modulation and detection technique for PAM only, Multiplexing.

#### **Unit-3**

**Digital Pulse Modulation:** Need for digital transmission, Pulse Code Modulation, Digital Carrier Modulation Techniques, Sampling, Quantization and Encoding. Concept of Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), and Binary Phase Shift Keying (BPSK).

**Optical Communication:** Introduction of Optical Fiber, Block Diagram of optical communication system.

#### **Unit-4**

**Introduction to Communication and Navigation systems:**

**Satellite Communication–** Introduction, need, Geosynchronous satellite orbits, geostationary satellite advantages of geostationary satellites. Satellite visibility,

transponders (C - Band), path loss, ground station, simplified block diagram of earth station. Uplink and downlink.

## **Unit-5**

**Mobile Telephony System** – Basic concept of mobile communication, frequency bands used in mobile communication, concept of cell sectoring and cell splitting, SIM number, IMEI number, need for data encryption, architecture (block diagram) of mobile communication network, idea of GSM, CDMA, TDMA and FDMA technologies, simplified block diagram of mobile phone handset, 2G, 3G and 4G concepts (qualitative only). GPS navigation system (qualitative idea only)

### **Reference Books:**

1. Electronic Communications, D. Roddy and J. Coolen, Pearson Education India.
  2. Advanced Electronics Communication Systems- Tomasi, 6<sup>th</sup> edition, Prentice Hall.
  3. Modern Digital and Analog Communication Systems, B.P. Lathi, 4<sup>th</sup> Edition, 2011, Oxford University Press.
  4. Electronic Communication systems, G. Kennedy, 3<sup>rd</sup> Edn., 1999, Tata McGraw Hill.
  5. Principles of Electronic communication systems – Frenzel, 3rd edition, McGraw Hill
  6. Communication Systems, S. Haykin, 2006, Wiley India
  7. Electronic Communication system, Blake, Cengage, 5<sup>th</sup> edition.
  8. Wireless communications, Andrea Goldsmith, 2015, Cambridge University Press
-

**Paper II**  
**ELB 202 :MICROPROCESSOR ANDMICROCONTROLLER**

**Theory:**

**Max. Marks :50**

**Unit-1**

**Microcomputer Organization:** Input/Output Devices. Data storage (idea of RAM andROM). Computer memory. Memory organization & addressing. Memory Interfacing. Memory Map.

**8085 Microprocessor Architecture:** Main features of 8085. Block diagram. Pin-outdiagram of 8085. Data and address buses. Registers. ALU. Stack memory. Program counter.

**Unit-2**

**8085 Programming :**Instruction classification, Instructions set (Data transfer includingstacks. Arithmetic, logical, branch, and control instructions). Subroutines, delay loops. Timing & Control circuitry. Timing states. Instruction cycle, Timing diagram of MOV and MVI. Hardware and software interrupts.

**Unit-3**

**8051 microcontroller:** Introduction and block diagram of 8051 microcontroller,architecture of 8051, overview of 8051 family, 8051 assembly language programming, Program Counter and ROM memory map, Data types and directives, Flag bits and Program Status Word (PSW) register, Jump, loop and call instructions.

**Unit 4**

**8051 I/O port programming:** Introduction of I/O port programming, pin out diagram of8051 microcontroller, I/O port pins description & their functions, I/O port programming in 8051 (using assembly language), I/O programming: Bit manipulation.

**8051 Programming:** 8051 addressing modes and accessing memory locations usingvarious addressing modes, assembly language instructions using each addressing mode, arithmetic and logic instructions,

**Unit 5**

8051 programming in C: for time delay & I/O operations and manipulation, for arithmetic and logic operations, for ASCII and BCD conversions.

**Introduction to embedded system:** Embedded systems and general purpose computersystems. Architecture of embedded system. Classifications, applications and purpose of embedded systems.

**Reference Books:**

1. Microprocessor Architecture Programming & applications with 8085, 2002, R.S. Goankar, Prentice Hall.
  2. Embedded Systems: Architecture, Programming & Design, Raj Kamal, 2008, Tata McGraw Hill
  3. The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A. Mazidi, J.G. Mazidi, and R.D. McKinlay, 2<sup>nd</sup> Ed., 2007, Pearson Education India.
  4. Microprocessor and Microcontrollers, N. Senthil Kumar, 2010, Oxford University Press
  5. 8051 microcontrollers, Satish Shah, 2010, Oxford University Press.
  6. Embedded Systems: Design & applications, S.F. Barrett, 2008, Pearson Education India
  7. Introduction to embedded system, K.V. Shibu, 1<sup>st</sup> edition, 2009, McGraw Hill
  8. Embedded Microcomputer systems: Real time interfacing, J.W. Valvano 2011, Cengage Learning
-

## **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 203P: COMMUNICATIONELECTRONICS LAB (Hardware and Circuit Simulation Software) 60 Lectures Max.Marks:25**

1. To design an Amplitude Modulator using Transistor
2. To study envelope detector for demodulation of AM signal
3. To study FM - Generator and Detector circuit
4. To study AM Transmitter and Receiver
5. To study FM Transmitter and Receiver
6. To study Time Division Multiplexing (TDM)
7. To study Pulse Amplitude Modulation (PAM)
8. To study Pulse Width Modulation (PWM)
9. To study Pulse Position Modulation (PPM)
10. To study ASK, PSK and FSK modulators

#### **Reference Books:**

1. Electronic Communication systems, G. Kennedy, 1999, Tata McGraw Hill.
2. Electronic Communication system, Blake, Cengage, 5th edition.

**ELB 204P: MICROPROCESSOR AND MICROCONTROLLER**  
**LAB(Hardware and Circuit Simulation Software)**

**Max.Marks:25**

**At least 06 experiments each from Section-A and Section-B**

***Section-A: Programs using 8085 Microprocessor***

1. Addition and subtraction of numbers using direct addressing mode
2. Addition and subtraction of numbers using indirect addressing mode
3. Multiplication by repeated addition.
4. Division by repeated subtraction.
5. Handling of 16-bit Numbers.
6. Use of CALL and RETURN Instruction.
7. Block data handling.
8. Other programs (e.g. Parity Check, using interrupts, etc.).

***Section-B: Experiments using 8051 microcontroller:***

1. To find that the given numbers is prime or not.
2. To find the factorial of a number.
3. Write a program to make the two numbers equal by increasing the smallest number and decreasing the largest number.
4. Use one of the four ports of 8051 for O/P interfaced to eight LED's. Simulate binary counter (8 bit) on LED's .
5. Program to glow the first four LEDs then next four using TIMER application.
6. Program to rotate the contents of the accumulator first right and then left
7. Program to run a countdown from 9-0 in the seven segment LED display.
8. To interface seven segment LED display with 8051 microcontroller and display 'HELP' in the seven segment LED display.
9. To toggle '1234' as '1324' in the seven segment LED display.
10. Interface stepper motor with 8051 and write a program to move the motor through a given angle in clock wise or counter clockwise direction.
11. Application of embedded systems: Temperature measurement & display on LCD

**Reference Books:**

1. Microprocessor Architecture Programming & applications with 8085, 2002, R.S. Goankar, Prentice Hall.
2. Embedded Systems: Architecture, Programming & Design, Raj Kamal, 2008, Tata McGraw Hill
3. The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A. Mazidi, J.G. Mazidi, and R.D. McKinlay, 2<sup>nd</sup> Ed., 2007, Pearson Education India.
4. 8051 microcontrollers, Satish Shah, 2010, Oxford University Press.
5. Embedded Microcomputer systems: Real time interfacing, J.W. Valvano 2011, Cengage Learning

To  
Registrar  
Pt. Ravishankar Shukla University  
Raipur-492 010, C.G.

II  
Raipur, dt. June 20<sup>th</sup>, 2018

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

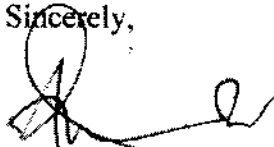
Reference: University letter no. 6507/ Acad/ CBS/2018, dt. 08-06-2018

Sir/ Madam,

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

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

Sincerely,



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

Enclosures:

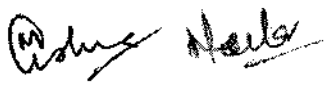
1. New Syllabus (one Hard and one Soft copy)
2. Nine leaflets indicating justification for changes incorporated
3. One Register on Minutes of the Meetings conducted
4. Attendance record of the members

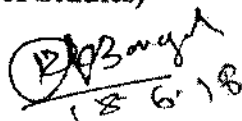
**Meeting of Central Board of Studies(Chemistry): 18<sup>th</sup> June, 2018**

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

Existing Syllabus	New Modified Syllabus	Justification of New Modified Syllabus
<p><b><u>B.Sc. PART-II</u></b> <b><u>PAPER I (Inorganic Chem)</u></b></p> <p><b>Unit-I</b> <b>First transition series</b></p> <p><b>Unit-II</b> <b>Second and third transition series</b></p> <p><b>Unit-III</b> <b>A. Oxidation and reduction</b> <b>B. Coordination Compounds</b></p> <p><b>Unit-IV</b> <b>A. Lanthanides</b> <b>B. Actinides</b></p> <p><b>Unit-V</b> <b>A. Acid and Bases</b> <b>B. Non-aqueous Solvents</b></p> <p><b><u>Laboratory Course</u></b> <b>Calibration, standard solution</b> <b>Quantitative analysis by volumetric method</b> <b>Colorimetry, solvent extraction, ion exchange</b></p>	<p>All d-block elements merged together. Now the title is 'Chemistry of Transition Series Elements'. In earlier syllabus this was divided in Unit-I &amp; II.</p> <p>Splitted to two parts. Part A- 'Oxidation and Reduction' Part B- 'Coordination Compounds'</p> <p>Both moved to Unit II. A new topic 'Coordination Chemistry' is placed.</p> <p>Same as existing</p> <p>Same as existing. With addition of HF, H<sub>2</sub>SO<sub>4</sub>, Ionic liquids in Part B.</p> <p>Changed to Advanced semimicro analysis Volumetric analysis Chromatographic separation of ions</p>	<p>Better composition</p> <p>Better composition</p> <p>Better composition and upgradation</p> <p></p> <p>Modification/ upgradation</p> <p>Modification/ upgradation To make the syllabus more appropriate at this level</p>

**(Signature of members of Central Board of Studies)**

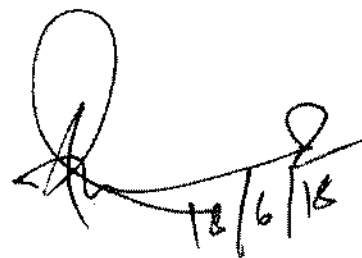
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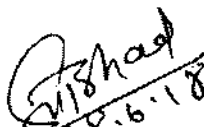
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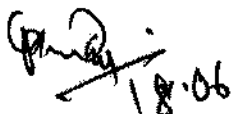
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# Meeting of Central Board of Studies(Chemistry): 18<sup>th</sup> June, 2018

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

## B.Sc. PART-II

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

(Signature of members of Central Board of Studies)

*Arshad Nadeem*  
18.6.18

*Dr. B. Singh*  
18.6.18

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**Meeting of Central Board of Studies(Chemistry): 18<sup>th</sup> June, 2018**

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

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

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## NEW CURRICULUM OF B.Sc. PART II

### 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

##### CHEMISTRY OF TRANSITION SERIES ELEMENTS

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

#### UNIT-II

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

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

#### UNIT-III

##### COORDINATION CHEMISTRY

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

#### UNIT-IV

##### A. CHEMISTRY OF LANTHANIDE ELEMENTS

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

##### B. CHEMISTRY OF ACTINIDES

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

#### **UNIT-V**

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

#### **B. NON-AQUEOUS SOLVENTS**

.Physical properties of a solvent, types of solvents and their general characteristics, reaction in non-aqueous solvents with reference to liquid ammonia and liquid sulphur dioxide, HF, H<sub>2</sub>SO<sub>4</sub> , Ionic liquids.

#### **REFERENCE BOOKS**

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

### **UNIT-I**

#### **CHEMISTRY OF ORGANIC HALIDES**

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

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

### **UNIT-II**

#### **ALCOHOLS**

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

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

#### **PHENOLS**

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

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

### **UNIT-III**

#### **ALDEHYDES AND KETONES**

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

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

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

ketones.

#### **UNIT-IV**

##### **A. CARBOXYLIC ACIDS**

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

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

##### **B. CARBOXYLIC ACID DERIVATIVES**

Structure of acid chlorides, esters, amides and acid anhydrides, Relative stability of acyl derivatives.

Physical properties, inter-conversion of acid derivatives by nucleophilic acyl substitution.

Mechanism of acid and base catalyzed esterification and hydrolysis.

#### **UNIT-V**

#### **ORGANIC COMPOUNDS OF NITROGEN**

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

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

#### **REFERENCE BOOKS**

1. Organic Chemistry, Morrison and Boyd, Prentice-Hall.
2. Organic Chemistry, L. G. Wade Jr. Prentice Hall.
3. Fundamentals of Organic Chemistry, Solomons, John Wiley.
4. Organic Chemistry, Vol I, II, III S. M. Mukherjee, S. P. Singh and R. P. Kapoor, Wiley Easters (New Age).
5. Organic Chemistry, F. A. Carey, McGraw Hill.
6. Introduction to Organic Chemistry, Struiweisser, Heathcock and Kosover, Macmillan.
7. Organic Chemistry, P. L. Soni.

8. Organic Chemistry, Bahl and Bahl.
9. Organic Chemistry, Joginder Singh.
10. Carbanic Rasayan, Bahl and Bahl.
11. Carbanic Rasayan, R. N. Singh, S. M. I. Gupta, M. M. Bakidia & S. K. Wadhwa.
12. Carbanic Rasayan, Joginder Singh.

**Paper – III**  
**PHYSICAL CHEMISTRY**

**60 Hrs., Max Marks 34**

**UNIT-I**

**A. THERMODYNAMICS-I**

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

**B. THERMO CHEMISTRY**

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

**UNIT-II**

**A. THERMODYNAMICS-II**

Second Law of Thermodynamics: Spontaneous process, Second law, Statement of Carnot cycle and efficiency of heat engine, Carnot's theorem, thermodynamic state of temperature.

Concept of entropy: Entropy change in a reversible and irreversible process, entropy change in isothermal reversible expansion of an ideal gas, entropy change in isothermal mixing of ideal gases, physical signification of entropy, Molecular and statistical interpretation of entropy.

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

### **UNIT III**

#### **A CHEMICAL EQUILIBRIUM**

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

#### **B IONIC EQUILIBRIA**

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

### **UNIT-IV**

#### **PHASE EQUILIBRIUM**

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

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

Three component system: Solid solution liquid pairs.

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

### **UNIT V**

#### **PHOTOCHEMISTRY**

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



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

### REFERENCE BOOKS

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

### Paper –IV

### LABORATORY COURSE

#### INORGANIC CHEMISTRY

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

$\text{CO}_3^{2-}$ ,  $\text{NO}_2^-$ ,  $\text{S}^{2-}$ ,  $\text{SO}_3^{2-}$ ,  $\text{S}_2\text{O}_3^{2-}$ ,  $\text{CH}_3\text{COO}^-$ ,  $\text{F}^-$ ,  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{I}^-$ ,  $\text{NO}_3^-$ ,  $\text{BO}_3^{3-}$ ,  $\text{C}_2\text{O}_4^{2-}$ ,  $\text{PO}_4^{3-}$ ,  $\text{NH}_4^+$ ,  $\text{K}^+$ ,  $\text{Pb}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Cd}^{2+}$ ,  $\text{Bi}^{3+}$ ,  $\text{Sn}^{2+}$ ,  $\text{Sb}^{3+}$ ,  $\text{Fe}^{3+}$ ,  $\text{Al}^{3+}$ ,  $\text{Cr}^{3+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Mn}^{2+}$ ,  $\text{Co}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Ba}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ .

Mixtures should preferably contain one interfering anion, or insoluble component ( $\text{BaSO}_4$ ,  $\text{SrSO}_4$ ,  $\text{PbSO}_4$ ,  $\text{CaF}_2$  or  $\text{Al}_2\text{O}_3$ ) or combination of anions e.g.  $\text{CO}_3^{2-}$  and  $\text{SO}_3^{2-}$ ,  $\text{NO}_2^-$  and  $\text{NO}_3^-$ ,  $\text{Cl}^-$ ,  $\text{Br}^-$ , and  $\text{I}^-$ .

#### Volumetric analysis

- (a) Determination of acetic acid in commercial vinegar using NaOH.
- (b) Determination of alkali content-antacid tablet using HCl.

- (c) Estimation of calcium content in chalk as calcium oxalate by permanganometry.
- (d) Estimation of hardness of water by EDTA.
- (e) Estimation of ferrous & ferric by dichromate method.
- (f) Estimation of copper using thiosulphate.
- Principles involved in chromatographic separations. Paper chromatographic separation of following metal ions: i. Ni (II) and Co (II) ii. Fe (III) and Al (III)

## ORGANIC CHEMISTRY

- Detection of elements (X, N, S).
- Qualitative analysis of unknown organic compounds containing simple functional groups (alcohols, carboxylic acids, phenols, nitro, amine, amide, and carbonyl compounds, carbohydrates)
- Preparation of Organic Compounds:
  - (i) m-dinitrobenzene, (ii) Acetanilide, (iii) Bromo/Nitro-acetanilide, (iv) Oxidation of primary alcohols-Benzoic acid from benzylalcohol, (v) azo dye.

## PHYSICAL CHEMISTRY

### Transition Temperature

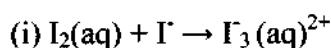
- Determination of the transition temperature of the given substance by thermometric/dilatometric method (e.g.  $\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$ / $\text{SrBr}_2 \cdot 2\text{H}_2\text{O}$ ).

### Thermochemistry

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

## Phase Equilibrium

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



## Molecular Weight Determination

Determination of molecular weight by Rast Camphor and Landsburger method.

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

## Reference Books

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

Hrs.5

PRACTICAL EXAMINATION

M.M.50

Three Experiments are to be performed.

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

OR

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

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

**6 marks**

(b) Determination of R<sub>f</sub> value and identification of organic compounds by paper chromatography.

**6 marks**

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

**12 marks**

4. Viva

**10 marks**

5. Sessional

**04 marks**

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

**Syllabus for B.A./ B.Sc. Course, 2018-19**  
**Subject:. Statistics**

Each year of B.A./B.sc. I, II, III shall have two theories and one practical course. All the Theory as well as Practical Examinations will be of 3 hours duration. In each practical examination 10% marks shall be fixed for viva –voce and 20% marks for practical record.

**Scheme of Examination**

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

**B.A./B.Sc. –II**  
**Subject: Statistics**  
**Paper-I( Paper Code-0853)**  
**Statistical Methods**

**Unit I**

Sampling from a distribution : Definition of a random sample ,simulating random sample from standard distributions(uniform, Normal, Exponential) ,concept of derived distributions of a functions of random variables, concept of a statistics and its sampling distribution. Point estimate of a parameter. Properties of a good estimator, Concept of bias and standard error of an estimate .Standard errors of sample mean, sample proportion. Sampling distribution of sum of Binomial, Poisson and mean of Normal distributions. Independence of sample mean and variance in random sampling from a Normal distribution ( without derivation).

**Unit II**

Statistical tests and interval estimation: Null and alternative hypothesis. Types of errors, level of significance, p values, one and two tailed tests, Procedure for testing of hypothesis. Statement of chi-squares, Student's t and F statistics. Testing for the single mean and variance of a univariate normal distribution, testing the equality of two means and testing for the equality of two variances of two univariate normal distributions. Related confidence intervals. Testing for the significance of sample correlation in sampling from bi-variate normal distribution and for equality of means and equality of variances in sampling from bivariate normal populations.

**Unit III**

Large sample tests: use of central limit theorem for testing and interval estimation of a single mean and a single proportion and difference of two means and two proportions, Fisher's Z transformation and its uses. Pearson's chi-square test for goodness of fit and for homogeneity for standard distributions. Contingency table and test of independence in a contingency table.

**Unit IV**

Nonparametric tests : Definition of order statistics and their distributions, Non-parametric tests, Sign test for univariate and bivariate distributions, Wilcoxon test, Mann-Whitney test, Run test, median test and Spearman's rank correlation test.

**Unit V**

Four short notes, one from each unit will be asked. Students have to answer any two.

**REFERENCES**

1. Frund J.E.(2001)Mathematical Statistics, Prentice Hall of India.
- 2.Goon A.M., Gupta M.K., Das Gupta.B. (1991):Fundamentals of Statistics, Vol.I, World Press, Calcutta.
3. Gupta and Kapoor: Fundamentals of Mathematical Statistics S.Chand & Sons.
- 4.Hodges, J.L. and Lehman E.L. (1964): Basic Concepts of Probability and Statistics, Holden Day.
- 5.Mood A.M, Graybill F.A and Boes D.C. (1974): Introduction to the Theory of Statistics, McGraw Hill.

## **ADDITIONAL REFERENCES**

1. Bhat B.R., Shrivenktramana T and Rao Madhava K.S. (1997): A Beginner's Text, Vol. II, New age International (P) Ltd.
2. Rohatgi, V.K. (1967): An Introduction to Probability Theory and Mathematical Statistics, John Wiley & Sons.
3. Snedecor, G.W. and Cochran W.G. (1967): Statistical Methods. Iowa State University Press.

### **Paper-II (Paper Code-0854)**

## **Sampling Theory and Design of Experiments**

### **Unit I**

Concepts of population and sample, need for sampling, Census and sample survey, Basic concepts in sampling, organizational aspects of survey sampling, sample selection and sample size. Some basic sampling methods – simple random sampling (SRS) with and without replacement.

### **Unit II**

Stratified random sampling, Systematic sampling, Allocation problems, ratio and regression methods of estimation under SRS.

Non-sampling errors, acquaintance of working ( questionnaires, sampling design, methods followed in field investigation, principal findings, etc) of NSSO and other agencies undertaking sample surveys.

### **Unit III**

Analysis of variance for one way and two-way classifications. Need for design of experiments, fundamental principal of design, basic designs- CRD, RBD, LSD and their analysis.

### **Unit IV**

Missing plot technique. Analysis of co-variance. Factorial experiments :  $2^2$ ,  $2^3$  factorial experiments, illustrations, main effects and interactions, confounding and illustrations. Yates method of finding treatment totals.

### **Unit V**

Four short notes, one from each unit will be asked. Students have to answer any two.

## **REFERENCES**

1. Cochran W.G. (1977): Sampling Techniques, John Wiley and Sons.
2. Des Raj (2000): Sample Survey Theory, Narosa Publishing House.
3. Murthy M.N(1967): Sampling Theory and Methods, Statistical Publishing Society, Calcutta.
4. Singh, D. and Chaudhary, F.S. (1986): Theory and analysis of Sample Survey Designs. New Age International Publisher.
5. Sukhatme P.V., Sukhatme B.V., Sukhatme S. and Ashok C.(1984), : Sample Survey Methods and Its Applications, Indian Society of Agricultural Statistics, New Delhi.
6. Das M.N. and Giri (1986) : Design and analysis of experiments, Springer Verlag.
7. Goon A.M., Gupta M.K., Das Gupta B. (1986): Fundamentals of Statistics, Vol.II, World Press, Calcutta.
8. Joshi, D.D.(1987): Linear Estimation and Design of Experiments, Wiley Eastern.
9. Kempthorne O.(1965) : The Design and Analysis of Experiments, Wiley Eastern.

### **Paper III:**

#### **Practical : Practicals Based on Paper I & II**

1. drawing random samples from standard univariate discrete and continuous distributions such as Binomial, Poisson, Normal, Cauchy and Exponential.
2. Tests of significance based on Student's t, Chi-square, F. Test of significance of sample correlation coefficient. Use of Z Transformation. Testing of equality of means and equality of variance in sampling from bivariate normal.
3. Large sample tests for means and proportions, tests of goodness of fit and independence of attributes in contingency tables.
4. Nonparametric tests: Sign, Run, Median, Wilcoxon, Mann-Whitney tests.
5. Selection of samples and determination of sample size. Simple random sampling, Stratified and systematic sampling. Allocation problem in stratified sampling. Ratio and regression methods of estimation.
6. Analysis of variance for one way and two way classifications. Analysis of CRD, RBD and LSD. Analysis of  $2^2$  and  $2^3$  experiments.



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

**Admitted Batch 2018-19**

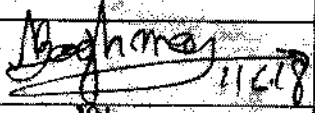
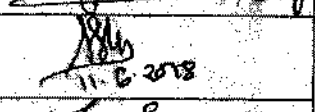





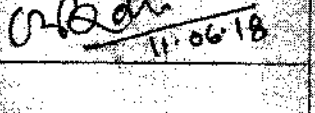
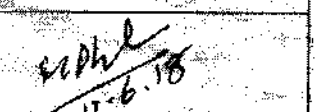



**JUNE 2018**

**Chhattisgarh State Council of Higher Education**

**उपस्थिति पत्रक**  
**केन्द्रीय अध्ययन मण्डल की बैठक**

अध्ययन शाला का नाम - भूगोल अध्ययन शाला, पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर  
बैठक दिनांक - 11/06/2018 समय - 11:00 बजे

क्रमांक	सदस्यों का नाम/पदनाम	हस्ताक्षर
1	डॉ. एन. के. बघमार, प्रोफेसर अध्यक्ष, भूगोल, अध्ययन मण्डल, पं. र. वि. वि. रायपुर	 11.6.18
2	डॉ. सरला शर्मा, प्रोफेसर एवं अध्यक्ष भूगोल अध्ययन, शाला, पं. र. वि. वि. रायपुर	 11.6.2018
3	डॉ. अमृत लाल पटेल, प्रभारी प्राचार्य (पदोन्नत प्राध्यापक) शासकीय महाविद्यालय, सरायपाली	 11.6.18
4	डॉ. डी. एल. पटेल, सहा प्राध्यापक अध्यक्ष, भूगोल, अध्ययन मण्डल, वस्तर वि. वि. जगदलपुर	 11.6.18
5	श्री गोपीशंकर साय, सहा प्राध्यापक अध्यक्ष, भूगोल, अध्ययन मण्डल, सरगुञ्जा वि. वि. अम्बिकापुर	 11/06/2018
6	डॉ. शीला श्रीधर, सहा प्राध्यापक एवं विभागाध्यक्ष, भूगोल विभाग शास. द. व महिला महा. रायपुर	 11/06/2018
7	डॉ. कृष्ण कुमार द्विवेदी, सहा प्राध्यापक, एवं विभागाध्यक्ष, भूगोल विभाग शास. के. डी. महिला महा. राजनांदगाव	 11/06/2018
8	श्री एम. एस. साहू, सहा प्राध्यापक एवं विभागाध्यक्ष, भूगोल विभाग शास. स्नातकोत्तर महा. कुरुद, धमतरी	 11.06.18
9	डॉ. सख्खा राम कुजाम, सहा प्राध्यापक शास. सहा. नाशयणपुर	
10	डॉ. एम. पी. गुप्ता, प्रोफेसर एवं पूर्व अध्यक्ष, भूगोल अध्ययन, शाला, पं. र. वि. वि. रायपुर, विशेष आमंत्रित सदस्य,	 11-6-18

  
11-6-18  
अध्यक्ष  
भूगोल अध्ययन शाला  
पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर

## केन्द्रीय अध्ययन मण्डल की बैठक

दिनांक 11/06/2018

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

अधिनियम के अन्तर्गत प्रावधान	सदस्य का नाम	हस्ताक्षर
34(क)(2)(i) विश्वविद्यालय के उन विषय के अध्ययन मण्डल के अध्यक्ष	<ol style="list-style-type: none"> <li>1. डॉ. एन. के. बघमार – अध्यक्ष, अध्ययन मण्डल, भूगोल, पं. रविशंकर शुक्ल वि.वि., रायपुर (छ.ग.)</li> <li>2. डॉ. डी.एल. पटेल – अध्यक्ष, अध्ययन मण्डल, भूगोल, बस्तर विश्वविद्यालय, जगदलपुर (छ.ग.)</li> <li>3. डॉ. गोपीश्वर साय – अध्यक्ष, अध्ययन मण्डल, भूगोल, सरगुजा विश्वविद्यालय, जगदलपुर (छ.ग.)</li> <li>4. डॉ. सरला शर्मा, अध्यक्ष, भूगोल अध्ययनशाला, पं. रविशंकर शुक्ल वि.वि., रायपुर (छ.ग.)</li> </ol>	
34(क)(2)(ii) कुलाधिपति द्वारा नामांकित महाविद्यालयों के स्नातकोत्तर स्तर के विभागाध्यक्ष	<ol style="list-style-type: none"> <li>1. डॉ. शीला श्रीधर, सहा. प्राध्यापक एवं विभागाध्यक्ष, भूगोल, शा. स्नातकोत्तर दू. ब. महिला महाविद्यालय, रायपुर (छ.ग.)</li> </ol>	
34(क)(3)(iii) कुलाधिपति द्वारा नामांकित महाविद्यालयों के स्नातक स्तर के विभागाध्यक्ष	<ol style="list-style-type: none"> <li>1. डॉ. एम. एस. साहू, सहा. प्राध्यापक एवं विभागाध्यक्ष, शास. महाविद्यालय, कुरुद, धमतरी (छ.ग.)</li> <li>2. डॉ. अमृत लाल पटेल, पदोन्नत प्राध्यापक एवं प्रभारी प्राचार्य, शासकीय महाविद्यालय, सरायपाली (छ.ग.)</li> <li>3. डॉ. गोपीश्वर साय – अध्यक्ष, शासकीय महाविद्यालय, सुरजपुर (छ.ग.)</li> <li>4. डॉ. डी.एल.पटेल – विभागाध्यक्ष, भूगोल शास. भानुप्रतापदेव स्नातकोत्तर, महाविद्यालय, कांकेर (छ.ग.)</li> </ol>	
34(क)(3)(iv) कुलाधिपति द्वारा आयुक्त उच्च शिक्षा की सिफारिश के आधार पर मनोनीत विषय विशेषज्ञ	<ol style="list-style-type: none"> <li>1. श्री के. के. द्विवेदी सहा. प्राध्यापक शास. के. डी. महिला महाविद्यालय, राजनांदगांव</li> </ol>	
34(क)(3)(v) आयुक्त उच्च शिक्षा का प्रतिनिधि		
विशेष आमंत्रित सदस्य	<ol style="list-style-type: none"> <li>1. डॉ. एम. पी. गुप्ता, से.नि. प्राध्यापक, पं. रविशंकर शुक्ल वि.वि., रायपुर</li> </ol>	



प्रपत्र

कक्षा : बैचलर ऑफ आर्ट्स/साइंस

विषय : भूगोल

संकाय : कला/विज्ञान

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

वर्तमान पाठ्यक्रम	नवीन संसोधित	नवीन संसोधित पाठ्यक्रम का औचित्य
संलग्नानुसार संलग्नक क्रमांक - 1	संलग्नानुसार संलग्नक क्रमांक - 2	<ol style="list-style-type: none"> <li>1. विश्वविद्यालय अनुदान आयोग के पाठ्यक्रम के अनुरूप विषय वस्तु का युक्ति-युक्तकरण किया गया है।</li> <li>2. छात्रों में विभिन्न प्रतियोगिता परीक्षा में सफलता के लिए नवीन पठन-पाठन शामिल कर प्रश्नपत्रों में संशोधन किया गया है।</li> <li>3. छ. ग. शासन की अपेक्षाओं के अनुरूप, क्षेत्रीय आवश्यकताओं को ध्यान में रखकर पाठ्यक्रम तैयार किया गया है।</li> </ol>

1. डॉ. एन. के. बसमार, अध्यक्ष
2. डॉ. सरला शर्मा, प्रोफेसर, सदस्य
3. डॉ. अमृत लाल पटेल, सदस्य
4. डॉ. डी. एल. पटेल, सदस्य
5. डॉ. मोपीश्वर साय, सदस्य
6. डॉ. नीला श्रीधर, सदस्य
7. डॉ. कृष्ण कुमार द्विवेदी, सदस्य
8. डॉ. एच. एस. साहू, सदस्य
9. डॉ. लक्ष्मण राम कुजाम, सदस्य
10. डॉ. एच. पी. गुप्ता, आमंत्रित सदस्य

~~Dr. S. K. Singh~~  
 Dr. H. K. Bhanu  
 Dr. Sarla Sharma  
 Dr. A. L. Patel, Govt. College, Sarai Padi  
 Dr. D. L. Patel (Chairman Board of Studies, Bhanu Univ.)  
 Dr. Sheela Chidambaram  
 Dr. S. K. Singh  
 Dr. S. K. Singh (M.S. SAMU) Govt. P.G. College, Kuzer

**PAPER - I**  
**ECONOMIC AND RESOURCES GEOGRAPHY**

**Max. Marks: 50**

**(Paper Code-0187)**

- Unit I**      Meaning, scope and approaches to economic geography; Main concepts of economic geography; Resource: concept and classification; Natural resources: soil, forest and water.
- Unit II**      Mineral resources: iron ore and bauxite; Power resources: coal, petroleum and hydro electricity; Resource conservation; Principal crops: wheat, rice, sugarcane and tea
- Unit III**     Agricultural regions of the world (Derwent Whittlesey); Theory of agricultural location (Von Thunen); Theory of industrial location (Weber); Major industries: iron and steel, textiles, petrochemical and sugar; industrial regions of the world.
- Unit IV**      World transportation: major trans-continental railways, sea and air routes; International trade: patterns and trends; Major trade blocks: LAFTA, EEC, ASEAN; Effect of globalization on developing countries.
- Unit V**      Conservation of resources; evolution of the concept, principles, philosophy, and approach to conservation, resources conservation and practices. Policy making and sustainable development.

**Books Recommended:**

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

**PAPER - II**  
**GEOGRAPHY OF INDIA**

**Max. Marks: 50**  
**(Paper Code-0188)**

- Unit I** Physical Features: Structure, Relief, Climate, Physiographic Regions, Drainage, Climate-origin and mechanism of monsoon, and regional and Seasonal variation.
- Unit II** Natural Resources: Soils - types, their distribution and characteristics. Water Resources (major irrigation and hydel power projects); Forests-types, distribution, economic significance and conservation. Mineral and Power resources-Iron-ore, Manganese, Copper, Coal, Petroleum and Natural gas, Non conventional sources of energy.
- Unit III** Cultural Features : Population - Growth, Density and Distribution. Agriculture - Major crops, impact of Green Revolution and Agricultural regions.
- Unit IV** Industries Localization, Development & Production - Iron and steel, Cotton Textile, Cement, Sugar, Transport, Foreign Trade. Industrial Region.
- Unit V** Detailed Study of the following regions of India : Kashmir Valley, North- East Region, Chhota Nagpur Plateau, Thar Desert, Islands of India.

**Books Recommended:**

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

**PAPER - III**  
**PRACTICAL GEOGRAPHY**  
**Max. Marks: 50**

**SECTION A**

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

- Unit I** Distribution Maps: Dot Map, Choropleth Map and Isopleth Map.
- Unit II** Map Projections: Definition and classification; Conical, Zenithal, and Cylindrical Projections.
- Unit III** Interpretation of Weather Maps: Use of Meteorological Instruments.
- Unit IV** Statistical Methods: Quartile: Mean Deviation, Standard Deviation and Quartile Deviation; Relative Variability and Co-efficient of Variation.

**SECTION B**

SURVEYING (M.M. 15)

- Unit V** Surveying: Whole Circle Bearing and Reduced Bearing, Methods of Prismatic Compass Survey.

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

**Books Recommended:**

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



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

(कोड क्रमांक 0187)

अधिकतम अंक: 50

- इकाई-1 :** आर्थिक भूगोल का अर्थ, विषय क्षेत्र एवं उपागम; आर्थिक भूगोल की आधारभूत संकल्पनाये; संसाधन : संकल्पनायें एवं वर्गीकरण; प्राकृतिक संसाधन : मिट्टी, वन एवं जल ।
- इकाई-2 :** खनिज संसाधन : लौह अयस्क एवं बाक्साईट; शक्ति संसाधन कोयला, पेट्रोलियम एवं जल विद्युत; संसाधन संरक्षण ; प्रमुख फसले: गेहूँ, चावल, गन्ना, एवं चाय ।
- इकाई-3 :** विश्व के कृषि प्रदेश (व्हिटलसी के अनुसार); कृषि अवस्थिति के सिद्धान्त (वॉन थ्यूनेन); औद्योगिक स्थानीयकरण का सिद्धान्त (वेबर); प्रमुख उद्योग : लौह एवं इस्पात, वस्त्र उद्योग, शैलरासायनिक एवं शक्कर; विश्व के औद्योगिक प्रदेश ।
- इकाई-4 :** विश्व परिवहन : प्रमुख ट्रांस महाद्वीपीय रेलवे, समुद्र एवं वायु मार्ग; अंतर्राष्ट्रीय व्यापार प्रतिरूप एवं प्रवृत्तियाँ; प्रमुख व्यापार संघ : लैटिन अमेरिकी स्वतंत्र व्यापार संघ (LAFTA), यूरोपीय साझा बाजार (EEC), दक्षिणी-पूर्वी एशियाई राष्ट्रों का संघ (ASEAN), विकासशील देशों पर भूमण्डलीकरण का प्रभाव ।
- इकाई-5 :** संसाधनों का संरक्षण; संकल्पनाओं का उद्भव, सिद्धांत, दर्शन एवं संरक्षण के उपागम, संसाधन संरक्षण एवं प्रवृत्तियाँ, अक्षय विकास एवं नीति निर्माण ।

**Books Recommended:**

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

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

(कोड क्रमांक 0188)

अधिकतम अंक: 50

- इकाई -1** भौगोलिक स्वरूप – संरचना, उच्चावच जलवायु, भू-आकृतिक प्रदेश, अपवाह, जलवायु-मानसून की उत्पत्ति एवं विकास प्रक्रिया तथा पादेशिक एवं मौसमी विविधता।
- इकाई -2** प्राकृतिक संसाधन – मिट्टियाँ, प्रकार, वितरण एवं विशेषताएँ, जल संसाधन, सिंचाई और बहुउद्देशीय परियोजनाएँ, वन-प्रकार, वितरण आर्थिक महत्व एवं संरक्षण। खनिज एवं शक्ति के संसाधन – लौह अयस्क, मैग्नीज, तांबा, कोयला, पेट्रोलियम और प्राकृतिक गैस, गैर पारंपरिक उर्जा, (सौर उर्जा, पवन उर्जा, ज्वारीय उर्जा, भूतापीय उर्जा)।
- इकाई -3** सांस्कृतिक तत्व, जनसंख्या वृद्धि, घनत्व और वितरण, कृषि प्रमुख खाद्य फसलें, हरित क्रांति का प्रभाव, कृषि प्रदेश।
- इकाई -4** उद्योग-स्थानीकरण, औद्योगिक विकास और उत्पादन – लौहा और इस्पात उद्योग, सूती वस्त्र उद्योग, सीमेंट, चीनी, यातायात और व्यापार, औद्योगिक प्रदेश।
- इकाई -5** भारत के निम्न प्रदेशों का विस्तृत अध्ययन कश्मीर घाटी, उत्तर पूर्वी प्रदेश, छोटा नागपुर का पठार, थार मरुस्थल भारत के द्वीप समूह।

**Books Recommended:**

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

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

अधिकतम अंक : 50

खण्ड-अ. मानचित्र की व्याख्या, प्रक्षेप और सांख्यिकीय विधियां ।

(25

अंक)

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

इकाई -2 प्रक्षेप - परिभाषा एवं प्रकार शंकवाकार, खमध्य बेलनाकार प्रक्षेप.

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

इकाई -4 सांख्यिकीय विधियां - विचलन- चतुर्थांक माध्य विचलन, मानक विचलन, चतुर्थक विचलन, सापेक्षिक परिवर्तनशीलता, प्रसरण गुणक ।

खण्ड-ब. सर्वेक्षण

(15

अंक)

इकाई -5 त्रिज्मीय सर्वेक्षण- पूर्णवृत्त दिक्मान, समानीत दिक्मान एवं त्रिज्मीय कम्पास सर्वेक्षण की विधियाँ ।

प्रायोगिक पुस्तिका और मौखिक परीक्षा

(10 अंक)

**Books Recommended:**

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

संशोधित पाठ्यक्रम  
बी.ए./बी.एस-सी./बी.कॉम./बी.एच.एस.-सी.  
भाग - दो, आधार पाठ्यक्रम  
प्रश्न पत्र - प्रथम (हिन्दी भाषा) (पेपर कोड - 0171)

पूर्णांक- 75

खण्ड - क निम्नलिखित 5 लेखकों के पाठ शामिल होंगे -

अंक-35

1. महात्मा गांधी - चोरी और प्रायश्चित
2. आचार्य नरेंद्र देव - युवकों का समाज में स्थान
3. वासुदेव शरण अग्रवाल - मातृभूमि
4. हरि ठाकुर - डॉ. खूबचंद बघेल
5. पं. माधवराव सप्रे - सम्भाषण-कुशलता

खण्ड-ख हिन्दी भाषा और उसके विविध रूप

अंक-16

1. कार्यालयीन भाषा
2. मीडिया की भाषा
3. वित्त एवं वाणिज्य की भाषा
4. मशीनी भाषा

खण्ड-ग हिन्दी की व्याकरणिक कोटियाँ

अंक-24

संज्ञा, सर्वनाम, विशेषण, क्रिया विशेषण,  
समास, संधि एवं संक्षिप्तियां  
अनुवाद व्यवहार : अंग्रेजी से हिन्दी में अनुवाद

इकाई विभाजन-

- इकाई- 1 चोरी और प्रायश्चित : महात्मा गांधी / कार्यालयीन भाषा, मीडिया की भाषा
- इकाई- 2 युवकों का समाज में स्थान : आचार्य नरेंद्र देव / वित्त एवं वाणिज्य की भाषा, मशीनी भाषा
- इकाई- 3 मातृभूमि: वासुदेवशरण अग्रवाल / संज्ञा सर्वनाम, विशेषण, क्रिया विशेषण
- इकाई- 4 डॉ. खूबचंद बघेल : हरि ठाकुर/समास, संधि,
- इकाई- 5 सम्भाषण-कुशलता : पं. माधवराव सप्रे, / अनुवाद - अंग्रेजी से हिन्दी में अनुवाद, संक्षिप्तियाँ

मूल्यांकन योजना -

प्रत्येक इकाई से एक-एक प्रश्न पूछे जाएंगे। प्रत्येक प्रश्न में आंतरिक विकल्प होगा। प्रत्येक प्रश्न के 15 अंक होंगे। प्रत्येक इकाई को दो-दो खण्डों (कमश 'क' और 'ख' में) विभक्त करते हुए निर्धारित पाठ से 8 एवं शेष पाठ्य सामग्री से 7 अंक के प्रश्न होंगे। इस प्रकार पूरे प्रश्न-पत्र के पूर्णांक 75 होंगे।

**पाठ्यक्रम संशोधन का औचित्य :** विद्यार्थी चर्चित एवं सुप्रसिद्ध व्यक्तियों के लेख के माध्यम से समाज एवं राष्ट्रहित के साथ-साथ व्यक्तित्व विकास विषयक मुद्दों से परिचित हो सके तथा व्याकरणक एवं भाषा विषयक प्रस्तावित पाठ्यक्रम के माध्यम से हिन्दी भाषा संबंधित प्रयोग पक्ष से परिचित होते हुए प्रतियोगी परीक्षाओं की दृष्टि से ज्ञानार्जन कर सके।

**अध्यक्ष- हिंदी अध्ययन मंडल**