B.P.S. Mahila Vishwavidyalaya, Khanpur Kalan, Sonipat-131305

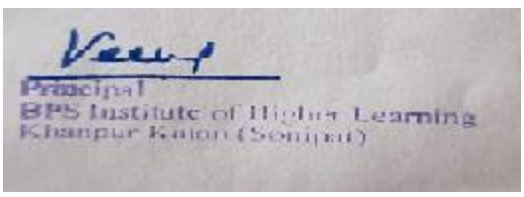
DEPARTMENT OF MEDICAL SCIENCE

COURSE CURRICULUM & SCHEME OF EXAMINATIONS

w.e.f. July, 2022

BOTANY

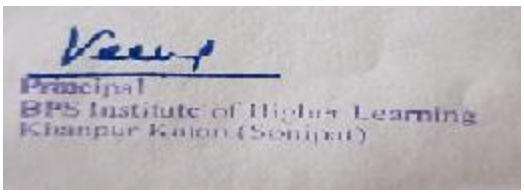
Programme Code-054



Programme Outcomes of B.Sc.medical

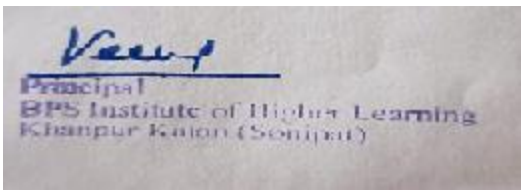
- Medical Students will become able to define and explain major concepts in the biological sciences.
- Students will be able to correctly use biological and chemical instrumentation and proper laboratory techniques.
- They will efficient to communicate biological and chemical knowledge in oral and written form.
- Students will be capable to recognize the relationship between structure and function at all levels: B.Sc. Medical students acquire knowledge in the subjects of Botany, Zoology, genetics and cellular.
- They can opt for higher studies in Botany, Zoology, Chemistry and Biochemistry and can have research carrer option.
- Students gain knowledge and skill in the fundamentals of animal sciences and plants, the complex interactions among various living organisms, understands their basic and apply them to their life careers.
- They understand the complex evolutionary processes and behaviour of animals and plants.
- Students get critically evaluation of ideas and arguments by collection relevant information about the plants and animals, so as recognize the position of plant in the broad classification and phylogenetic level.
- Career options after completing B.Sc with medical science:

  Teaching
  Evolutionarist
  Taxonomist
  Forensic laboratory
  Agriculture
  Sericulture
  Aquaculture
  Butterfly farming
  Apiculture
  Vermicomposting
  Research



Programme Specific Outcomes of B.Sc. Botany

- Students can identify problems and independently propose solutions using creative approaches, acquired through interdisciplinary experiences, and a depth and breadth of knowledge/expertise in field of Plants.
- Students will be able to apply the scientific method to questions in botany by formulating testable hypotheses, collecting data that address these hypotheses, and analyzing those data to assess the degree to which their scientific work supports their hypotheses.
- Students will be able to access the primary literature, identify relevant works for their research work For further studies.
- Students will be able to apply fundamental mathematical tools (statistics, calculus), get knowledge of using equipment and physical principles (physics, chemistry) to the analysis of relevant biological situations.
- Students will be able to identify the major groups of organisms with an emphasis on plants and could get carrer option as taxonomist or evolutionarist by having knowledge about the evidence of comparative biology to explain how the theory of evolution offers the only scientific explanation for the unity and diversity of life on earth.
- Students understand the impact of the plant diversity in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- Students get knowledge to assess plant diversity, its importance for society, health, safety, legal and environmental issues and the consequent responsibilities relevant to the biodiversity.
- This course provide knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary.
- Having knowledge about medicinal plants, students could get job opportunities in pharmaceutical companies.
- In botany students study about species variety of different plants ,this knowledge help them in making hybrid species of resistant varieties in Agriculture farm.
- Having knowledge of ecological environment, species interactions and with environment students get to know importance of sustainable environment. They would be conscious about environment changes that are harming our planet's environment and will make steps in making our planet healthy.



Syllabus of B.Sc. (Medical)
W.e.f. July 2022
(1st Semester)
BOTANY

Paper Code: BOT– 101A
Diversity of Microbes and Cryptogams (Algae & Fungi)

L – T – P **Total Credits: 03**
3 - - - - Total Marks: 50

External Marks: 40
Internal Marks: 10

Note- Attempt five questions in all, selecting one question from each unit. Question Number 1 is compulsory (short answer type). Nine questions are to be set in total Spread over the entire syllabus. All questions carry equal marks.

Course Objectives: To identify the major group of organisms with an emphasis on microbes and cryptogams and to classify them within a phylogenetic framework.

Unit- I

Bacteria- Structure, Nutrition Multiplication, and Economic Importance of bacteria, General account of Cyanobacteria.
Algae - General Characters, Classification and economic importance.

Unit- II

Algae- Important features and Life History of Chlorophyceae- *Volvox, Oedogonium, Chara,* Xanthophyceae- *Vaucheria,* Pheophyceae-*Ectocarpus.* Rhodophyceae- *Polysiphonia.*

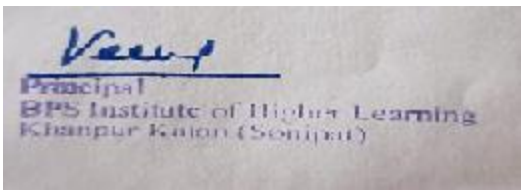
Unit- III

Viruses - General account of Virus including structure of TMV and Bacteriophage.

Fungi- General Characters, Classification by Ainsworth (1973), Alexopoulas et al. (1996) and economic importance.

Unit- IV

Fungi- Important Features and Life History of Mastigomycotina- (*Phytophthora*), Zygomycotina (*Mucor*), Ascomycotina (*Penicillium*) Basidiomycotina (*Puccinia, Agaricus*), Deuteromycotina (*Colletotrichum*). Brief account of Lichens.



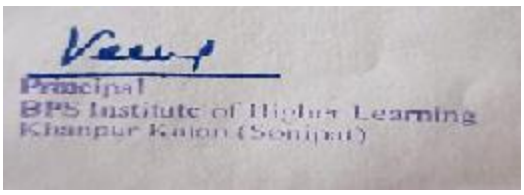
- Course Outcomes: Students will be able to compare and contrast the characterstics of microbes and cryptogams that differentiate them from each other and from other forms of life.

- Student will be able to study about the structure of Bacteria and Virus and their disease cycle.

- By observing and collecting the various members of Algae and Fungi in specimen and living forms, students will understand the life-cycles of these organisms in a better way.

Suggested Readings:-

Biswas S. B., Biswas Amita 1984. An Introduction to Viruses. Vikas Publishing House PVT LTD .
Smith , G.M. 1971 . Cryptogamic Botany Vol. 1. Algea & Fungi. Tata Mc Graw Hill Publishing Co ., New Delhi.
Sharma, O.P. 1992. Text Book of Thallophytes , McGraw Hill Publishing Co.
Sharma, P.D. 1991 The Fungi. Rastogi & Co Meerut.
Clifton, A. 1958. Introduction to the Bacterial. Mcgraw Hill & Co. New York.
Alexopoulas , C.J. , C.W. M. Mims , 1996. Introductory Mycology , 4th ed., John Wiley and Sons Inc .
Dube, H.C. 1990 . An Intoduction to Fungi , Vikas Publishing House PVT. LTD. Delhi.



Syllabus of B.Sc. (Medical)
w.e.f. July 2022
(1st Semester)
BOTANY

Paper Code: BOT– 101B Cell Biology

L – T – P **Total Credits: 03**
3 - - - - Total Marks: 50

External Marks: 40
Internal Marks: 10

Note- Attempt five questions in all, selecting two questions from each unit. Question number 1 is compulsory (short answer type). Nine questions are to be set, spread over the entire syllabus. All questions carry equal marks.

Course Objectives: Students will get knowledge about prokaryotic and Eukaryotic cells and the structure and functions of Cell Organelles.

Unit- I

Basic cell structure, composition and cell division:-Prokaryotic & Eukaryotic cell system, Cell division: Amitosis, Mitosis & Meiosis.

Unit – II

Cell Envelops and Bio molecules:-Structure and functions of cell wall and plasma membrane.
General account of carbohydrates.

Unit- III

Cell Organelles: - Ultrustructure and function of nucleus, Golgi apparatus, Endoplasmic reticulum, Chloroplast, Mitochondria.

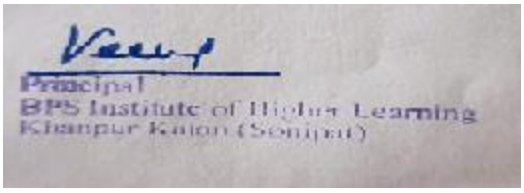
Unit- IV

Cell Organelles and Bio molecules: - Ultrustructure and functions of Lysosomes, Peroxysomes, Ribosomes, and Vacuoles. General account of proteins and lipids.

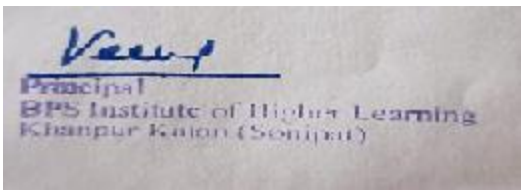
Course Outcomes:

- By understanding the working of cells in healthy and diseased state, students will be helped in further research areas for higher studies.

<u>Suggested Reading</u> :-



Alberts, B.Bary, D. Lewis , J. Raff, M., Roberts, K. and Watson, I.D. 1999. Molecular Biology of Cell. Garland Publishing Co. , Inc, New York. US.
Gupta , P.K. 1999 . A Text Book of Cell and Molecular Biology. Rastogi Publication, Meerut, India.
Kleinsmith L.J. and Kish, V.M. 1995. Principles of Cell and Molecular Biology (2nd Edition). Harper Collins College Publisher, New York, USA.
Lodish, H., Berk, A Zipursky, S.L. Matsudaira. P., Baltimoe , D. and Darnell, J.2000. Molecular Biology, W.H. Freeman and Co., New York., USA.
Powar, C.B. 1983. Cell Biology.(3rd Edition). Himalaya Publishing House.
Lehninger , A.L. , Nelson , D.K. and Cox , M.M. 1993. Principles of Biochemistry , CBS Publishers and Distributors , New Delhi.



Syllabus of B.Sc. (Medical)
w.e.f. July 2022
(1st Semester)
BOTANY

Paper Code: BOP– 101 **Practical**

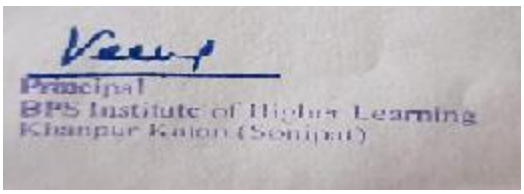
L – T – P
- - - - 4

Total Credits: 02
Total Marks: 50

External Marks: 40
Internal Marks: 10

List of Practical's:-

1. Preparation of temporary slides of various members of Algae and Fungi (as per Syllabus) to study vegetative and reproductive structure.
2. Identification of Permanent Slides of algae, fungi and lichens.
3. Slide preparation & Mitosis from Onion root tips & identification of various mitotic stages & Meiosis from onion flower buds and identification of major stages.
4. Survey of the area for the collection of the Algae, diseased plants and fungi.
5. Preparation of Survey/ Collection Report.
6. Viva-Voce and Practical Record.



Syllabus of B.Sc. (Medical)
W.e.f. July 2022
(2nd Semester)
BOTANY

Paper Code: BOT-102A
Diversity of Cryptogams (Bryophytes & Pteridophytes)

L – T – P **Total Credits: 03**
3 - - - - **Total Marks: 50**

External Marks: 40
Internal Marks: 10

Note- Attempt five questions in all, selecting one question from each unit. Question Number 1 is compulsory (short answer type). Nine questions are to be set in total Spread over the entire syllabus. All questions carry equal marks.

Course Objectives : it will in understanding the diversity,identification , classification and economic importance of lower plants and their role in evolution.

Unit- I

Bryohpyta:- Amphibians of Plant kingdom, displaying alternation of generations, General characters, Economic importance, Alternation of generation and classification (up to classes), Structure and Reproduction of *Marchantia* (Hepaticopsida)

Unit- II

Structure and Reproduction of *Anthoceros* (Anthoceropaida), *Funaria* (Bryopsida.). General account of sporophyte evolution in Bryophytes

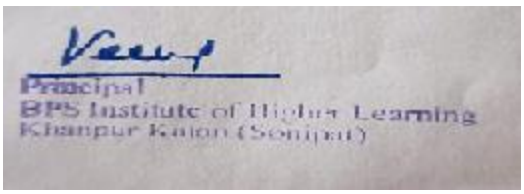
Unit-III

Pteridophyta:- The First vascular Plant, General characters, Economic importance, Alternation of generation and classification (up to classes). Structure and Reproduction of *Rhynia* (Psilopsida), *Selaginella* (Lycopsida)

Unit-IV

Structure and Reproduction of *Equisetum* (Sphenopsida), *Pteris*. (Pteropsida). Evolution of stellar system.

Course Outcomes:



- Students will develop understanding about the diversity, identification, classification and economic importance of lower plants and their role in evolution.

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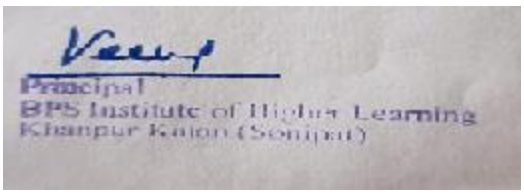
Suggested Readings:-

Parihar, N.S. (1972) An introduction to Embryophyta Vol. Bryophyta Central Book Ltd Allahabad.
Waston, E.V. 1982. Structure and Life of Bryophytes B.I. Publishers.
Smith , G.M. 1971. Cryptogamic Botany. Vol. 11. Bryophytes and Pteridophytes. Tata Mc Graw Hill Publishing Co., New Delhi.
Sharma O.P. 1990. Text Book of Pteridophyta , Mcmillan, India Ltd.
Puri, P. 1980, Bryophyta Atma Ram & Sons Delhi.
Sporne, K.R. ,1982. The Morphology of Pteridophytes. B.I.



Syllabus of B.Sc. (Medical)

w.e.f. July 2022
(2nd Semester)
BOTANY

Paper Code: BOT-102B Genetics

L – T – P
3 - - - -

Total Credits: 03
Total Marks: 50

External Marks: 40
Internal Marks: 10

Note- Attempt five questions in all, selecting one question from each unit. Question Number 1 is compulsory (short answer type). Nine questions are to be set in total Spread over the entire syllabus. All questions carry equal marks.

Course Objectives: It helps in understanding the pattern of inheritance of various life forms, DNA Structure and functions of genes,Chromosomal structure and alterations, mutations and genetic engineering etc.

Unit –I

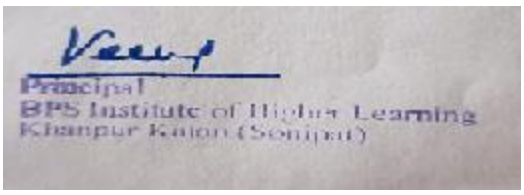
Chromosome Organisation: - Morphology, Centromere and Telomere, Giant Chromosomes, Sex Chromosome, Karyotype.
DNA the Genetic Material: - DNA Structure, Replication, DNA-protein interaction; the Nucleosome models; Genetic Code.

Unit- II

Genetic Inheritance: - Mendelism; Laws of segregation and independent assortment; Linkage analysis; Allelic and non allelic interaction; Crossing over.

Unit –III

Genetic Variations:- Variation in structure , Deletion, Duplication, Translocations, Inversions, Variations in Chromosome number, Aneuploidy, Polyploidy .Mutation, Spontaneous and induced, Transposable genetic elements, DNA damage and repair.



Unit-IV

Extra nuclear Genome:- Presence and function of mitochondrial and Plastid DNA, Plasmids.

Gene Expression: - Structure of gene and transfer of Genetic information (Translation and Protein synthesis & rRNA, tRNA, mRNA, Protein I D, 2D&3D structure), Regulation of gene expressions in prokaryotes (Operon Concept).

Course Outcomes:

- Students understand the pattern of inheritance of various life forms, DNA Structure and functions of genes,Chromosomal structure and alterations, mutations and genetic engineering etc.

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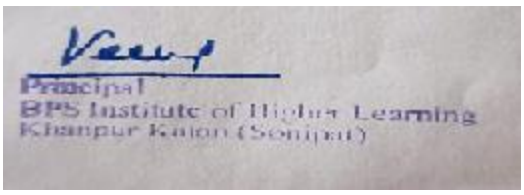
Suggested Readings:-

Snustad ,D.P. and Simmons, M,J, 2000. Principles of Genetics John wiley and Sones Inc USA.
Russel, P.J. 1998. Genetics. The Benjamin/ Cummings Publishing Co Ine , USA.
Stent, G.S.1986. Molecular Genetics, OBS Publications.
Brown , T.A. 1999. Genome. John wiley and sons (Asia) PVT Ltd.
Purohit, S.S. 2006. Gene , Genetics and Genetic Engineering. Agrobios India.
Joshi , P . 2004 Genetic Engineering and its Applications (2^{nd} Ed). Agrobios, India.
Babcock, E.B. 2004. Genetics and Plant Breeding Agrobios, India.
Lodish,H., Berk., A., Zipursky, S.L., Matudaria, P., Baltimore, D. and Darnell, J., 2000. Cell and Molecular Biology, W.H. Freeman and Co., Newyork, U.S.A.
Gupta, P.K. 1999. A Text Book of Cell and Molecular Biology. Rastogi Publication Meerut India.



Syllabus of B.Sc. (Medical)
w.e.f. July 2022
(2nd Semester)
BOTANY

Paper Code: BOP-102 practical

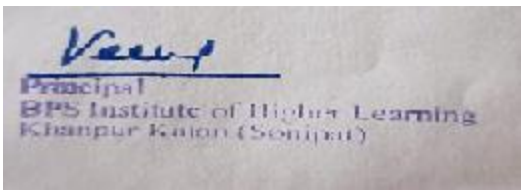
L – T – P
- - - - 4

Total Credits: 02
Total Marks: 50

External Marks: 40
Internal Marks: 10

List of Practicals:-

1. Study of Specimens from bryophytes (as per syllabus).
2. Study of Specimens from Pteridophytes (as per syllabus).
3. Identification of permanent slides of bryophytes and pteridophytes (As per theory Syllabus).
4. Experiments on Monohybrid and Dihybrid ratio.
5. Gene interactions and modified Dihybrid ratio.
6. Chi- Square analysis.
7. Study of giant chromosomes (Polytene, lampbrush) and karyotype by slides or models.
8. Field Tour of an area rich in diversity of bryophytes and pteridophytes (Hill Station) and Preparation of Herbarium and Survey Report.
9. Practical Record and Viva-voce.



Syllabus of B.Sc. (Medical)
w.e.f. July 2022
(3rd Semester)
BOTANY

Paper Code: BOT-201A **Diversity & Systematics of Seed Plants-I**

L – T – P **Total Credits: 03**
3 - - - - **Total Marks: 50**

External Marks: 40
Internal Marks: 10

Course Objectives: It will help students in having knowledge about diversity, physiological adaptations, development, reproduction and behaviour of Gymnosperms.

Paper I (Theory) - Diversity & Systematics of Seed Plants-I
BOT-201

Note- Attempt five questions in all, selecting one question from each unit. Question Number 1 is compulsory (short answer type). Nine questions are to be set in total Spread over the entire syllabus. All questions carry equal marks.

Unit-I

Characteristics of seed plants; evolution of seed habit. Seed plants with (angiosperms) & without (gymnosperms) fruits. Evolution & diversity of gymnosperms, general features of gymnosperms.

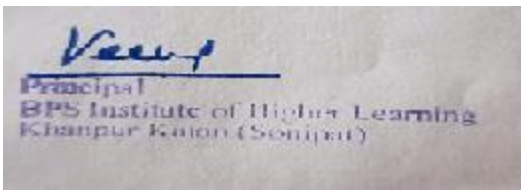
Unit- II

Distribution and economic importance of Gymnosperms. Classification of gymnosperms, fossilization process .

Unit-III

Fossil gymnosperms:-*Lyginopteris, Glossopteris, Williamsonia, Medullosa, Cycadeoidea (Bennettites), Cordaites.*
Morphology of vegetative & reproductive parts: - Anatomy of root, stem & leaf reproduction and life cycle of *Cycas.*

Unit-IV



Morphology of vegetative & reproductive parts: - Anatomy of root, stem & leaf reproduction and life cycle of:-

Pinus

Ephedra.

Course Outcomes:

- Knowing diversity and systematic of seed plants students will be able to give specific examples of the physiological adaptations, development, reproduction and behaviour of Gymnosperms.
- Students will be able to know about species diversity of Gymnosperms.

Suggested Readings:-

Bhatnagar, S.P. and Moirtra, A., 1996. Gymnosperms, New age International Limited, New Delhi.

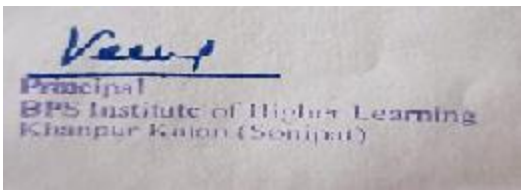
Gifford, P.H. and Heywood, V.H., 1963. Morphology and Evolution of Vascular Plants, W.H. Freeman & Company, New York.

Sporne, K.R., 1965 . The morphology of Gymnosperms, Hutchinson & Co.,(Publishers) Ltd., London.

Stewart, W.M., 1983. Paleobotany and The Evolution of Plants, Cambridge University Press, Cambridge.

Bierhorst, D.W. (1971). Morphology of Vascular Plants. MacMillian Company Ltd. New York.

Sporne K.R., 1982. The Morophology of Gymnosperms . B.I. Publishers .



Syllabus of B.Sc. (Medical)
w.e.f. July 2022
(3rd Semester)
BOTANY

Paper Code: BOT-201B **Plants Anatomy**

L – T – P **Total Credits: 03**
3 - - - - **Total Marks: 50**

External Marks: 40
Internal Marks: 10

Note- Attempt five questions in all, selecting one question from each unit. Question Number 1 is compulsory (short answer type). Nine questions are to be set in total Spread over the entire syllabus. All questions carry equal marks.

Course Objectives: Here students will get information about anatomical characters of vegetative and floral parts of flowering plants and will know about integrated organisms structure and function.

Unit-I

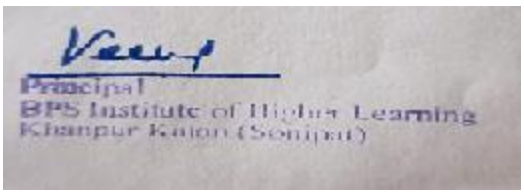
Diversity in plant forms in annuals, biennials and perennials, Body parts of Flowering plant and Modular growth.
Tissues: Types of tissues in flowering plants. Cambium & its functions.

Unit –II

The Shoot System: The shoot apical meristen & its histological organization; Vascularisation of Primary shoot in monocotyledons and dicotyledons. ; Secondary growth/ formation of secondary xylem and phloem, Secondary growth in extraxylary region/ Periderm. A general account of wood structure and its characteristics. Anomalous Secondary growth in *Boerhaavia, Mirabilis* and *Dracaena*.

Unit-III

The Shoot System: Formation of internodes, Branching pattern, Monopodial & Sympodial growth. Canopy architecture.
Leaf- Origin development, arrangement & diversity in size & shape, internal structure in relation to photosynthesis & water loss. Adaptations to water stress; Senescence and abscission.



Unit- IV

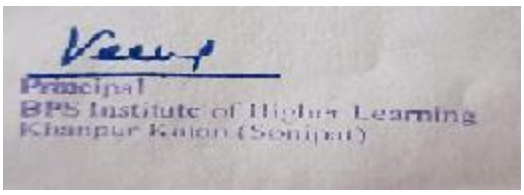
The Root System- the root apical meristem; differentiation of Primary & Secondary tissues and their roles; Types of root system. Structural modifications for storage, support, respiration, propagation and perennation, root nodules.
Vegetative propagation and its economic aspects.

Course Outcomes:

- Anatomical characters of vegetative and floral parts of flowering plants have been successfully employed to solve taxonomic problems and for the elucidation of phylogenetic relationships
- The practical study of anatomical structures helps to reveal the relationships between structure,functions,taxonomy,ecology and developmental genetics.

Suggested Readings:-

Cutter, E.G., 1969 . Part I, Cells and Tissues, Edward Arnold, London.
Cutter, E.G., 1971. Plant Anatomy: Experiment and Interpretation, Part II, Organs, Edward Arnold , London.
Esau, K., 1977. Anatomy of Seed Plants, (2nd Edition), John Wiley & Sons, New York.
Eames, A.J. and Mac Daniels L.H. 1947. An introduction to Plant Anatomy. Mc. Graw Hill Book Co. New York.
Esau, K. (1985). Plant Anatomy, Wiley-Eastern, New Delhi .
Fahn, A., 1974. Plant Anatomy, (2nd Edition) , Pergamon Press, Oxford.
Hartmann, H.T., and Kestler, D.E., 1976. Plant Propagation: Principles and Practices, (3rd Edition), Prentice Hall of India Pvt. Ltd., New Delhi.
Mauseth, J.D., 1988. Plant Anatomy, The Benjamin/Cumming Publishing Company Inc., Menlo Park, California, U.S.A.
Bier horst, D.W. (1971) Morphology of Vascular Plants. MacMillian Company Ltd. New York.



Syllabus of B.Sc. (Medical)
w.e.f. July 2022
(3rd Semester)
BOTANY

Paper Code: BOP-201 **Practical**

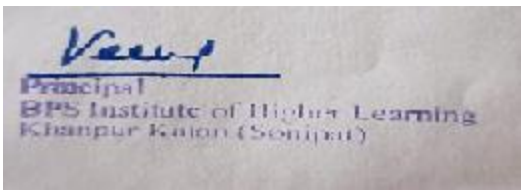
L – T – P
- - - - 4

Total Credits: 02
Total Marks: 50

External Marks: 40
Internal Marks: 10

Diversity of seed plants & plant anatomy:-

1. Identification and classification of the specimens from gymnosperms and angiosperms with a note on features for identification. (As per theory syllabus)
2. Permanent and double stained slide preparations of gymnosperms and angiosperms. (As per syllabus)
3. Identification of permanent slides (gymnosperms and angiosperms) giving reasons. (As per theory syllabus)
4. Collection of wild angiosperms from the surrounding areas and gymnosperms From hilly areas and preparation of a field report (Rare plants should not be collected).
5. Note book, Viva-voce.



Syllabus of B.Sc. (Medical)
w.e.f. July 2022
(4th Semester)
BOTANY

Paper Code: BOT-202A Diversity & Systematic of Seed Plant-II

L – T – P
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Total Credits: 03
Total Marks: 50

External Marks: 40
Internal Marks: 10

Paper I (Theory) - Diversity & Systematic of Seed Plant-II

Note- Attempt five questions in all, selecting one question from each unit. Question Number 1 is compulsory (short answer type). Nine questions are to be set in total Spread over the entire syllabus. All questions carry equal marks.

Course Objectives: Students study about the botanical nomenclature and criteria of classification, use of computers in studying Angiospermic taxonomy.

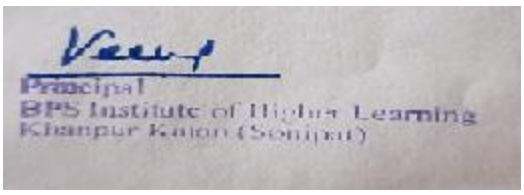
Unit-I

Taxonomy and Systematic:- Aims & fundamental components of taxonomy (identification, Classification , Nomenclature, description and Phylogeny), taxonomic literature. Role of chemotaxonomy, cytotaxonomy and taximetrics in relation to taxonomy.

Unit- II

.Botanical Nomenclature- Principles and rules, Principle of priority, Type concept, taxonomic ranks .Keys of identification of plants- Herbarium, Botanical gardens, Dichotomous keys.

Unit-III



Classification of Angiosperms: - Salient features of the system proposed by Bentham & Hooker and Engler & Prantle. Principles and basics of phylogenetic classification (APG System) by Takhtajan. Origin of angiosperms and relationship of major groups.
Diversity of flowering plants as illustrated by members of the families.
Ranunculaceae, Brassicaceae, Malvaceae

Unit- IV

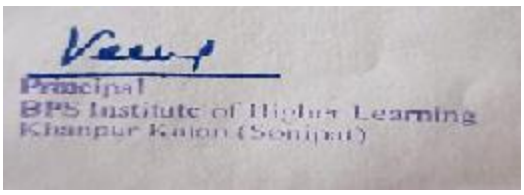
Euphorbiaceae, Rutaceae, Fabaceae, Apiaceae, Asclepiadaceous, Lamiaceae, Solanaceae, Asteraceae, Liliaceae and Poaceae.

Course Outcomes:

- Knowing diversity and systematic of seed plants students will be able to give specific examples of the physiological adaptations, development, reproduction and behaviour of Angiosperms.
- Students will be able to know about species diversity of Angiosperms.

Suggested Readings:-

Sivarajan, V.V. (1985). Introduction to Principles of Plant Taxonomy .Oxford & IBH Publ. Co., New Delhi .
Mathur, R.C. and Chauhan, S.V.S. (1989) . Systematic Botany, Agra Book Store, Agra.
Davis, P.H. and Heywood, V.H., 1963 . Principles of Angiosperm Taxonomy, Oliver and Boyd, London.
Heywood, V.H. and Moore, D.M. (eds.), 1984. Current Concepts in Plant Taxonomy, Academic Press , London.
Jeffrey, C., 1982. An introduction to Plant Taxonomy, Cambridge University Press London.
Jones, S.B., Jr. and Luchsinger A.F., 1986. Plant Systematics (2nd Edition), McGrawHill Book co., New York .
Maheshwari, J.K., 1963. Flora of Delhi, CSIR, New Delhi.
Radford, A.E., 1986. Fundamentals of Plant Systematics, Harper and Row, New York.
Stace, C.A., 1989. Plant Taxonomy and Biosystematics (2nd Edition), Edward Arnold, London.
Willis, K.J. and Mc Elwaine , J.C. (2002) . The evolution of plant, Oxford University Press.
Singh , G. (2004). Plant systematics- Theory and Practice (2nd ed.) Oxford of IBH Publishing Co. Pvt. Ltd New Delhi.
Gurcharan Singh ( ) Plant Taxonomy.



Syllabus of B.Sc. (Medical)

W.e.f. July 2022
(4th Semester)

BOTANY

Paper Code: BOT-202B
Reproduction & Embryology of Flowering Plants

L – T – P **Total Credits: 03**
3 - - - - Total Marks: 50

External Marks: 40
Internal Marks: 10

Note- Attempt five questions in all, selecting one question from each unit. Question Number 1 is compulsory (short answer type). Nine questions are to be set in total Spread over the entire syllabus. All questions carry equal marks.

Course Objectives: Students study about reproduction, pollination, pollinating agencies, about differentiation of reproductive organs of flowering plants.

Unit –I
Flower

A modified shoot; structure & functions of various floral parts, types of Inflorescence. Structure of Microsporangium and dehiscence mechanism, Microsporogenesis, Pollen grains and its structure, Pollination (Types and Agencies)

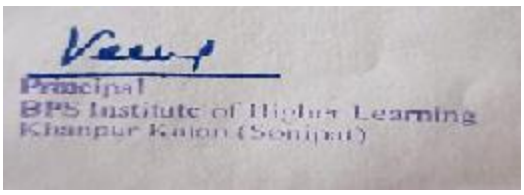
Unit- II

Microgametogenesis

Pollen germination, Development of male Gametophyte; Pollen-Pistil interaction; Self - Incompatibility.

Unit-III

Megasporogenesis and Megagametogeness



Structure of Megasporangium (Ovule); Types of ovule; megasporogenesis ;
Development of female gametophyte & its Types (Mono, Bi & tetrasporic); Double fertilization; **Endosperm** Types and its biological importance.

Unit- IV

Embryogenesis in Dicot and monocot; Polyembryony
Seed & Fruit- Formation of seed; seed structure; types of seed; germination; ecological; adaptations, dispersal strategies. Formation of fruit & types of fruit.

Course Objectives:

- Students will get knowledge about reproduction, pollination, pollinating agencies, about differentiation of reproductive organs of flowering plants.
- They will know about structure and formation of endosperm, seed and fruit.

Suggested Readings:

Bhojwani. S.S.and Bhatnagar S.P. (1985) . The Embrylogy of Angiosperms. Vani Educational Books , New Delhi.

Bhojwani , S.S. and Bhatnagar, S.P., 2000. The Embryoligy of Angiosperms, 4th Revised and Enlarged Edition, Vikas Publishing House, Delhi.

Fageri, K., and Van Der Pijl, 1979 The Principles of Pollination Ecology, Pergamon Press, Oxford.

Proctor, M. and Yeo, P., 1973 The Pollination of Flowers, William Collins Sons London.

Raven, P.H., Evert, R.F. and Eichhorn, S.E., 1999. Biology of Plants, 5th Edition , W.H., Freeman and Co., Worth Publishers, New York.

Thoms, P., 2000. Trees: Their Natural History, Cambridge University Press, Cambridge.

Mukundan, U. 1997. Botany A New Approach . Agrobios , India.

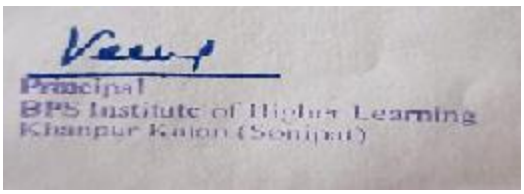
Purohit, S.S. 2002. Flowering Physiological, Biochemical and Molecular Aspects. Agrobios, India.

Good, R. 2006. Flowering Plants and their evolution . Agrobios, India.

Shivanna, K.R., Johris,B.M. 1985. Angiosperm Pollens. Narosa.

Dey , S.C. 2005. Fruits growing in Pots Agrobios , India.

Vanangamudi, K. 2006. Advances in Seed Science and Technology: Forest Tree Seed Production (Vol.4). Agrobios, India.



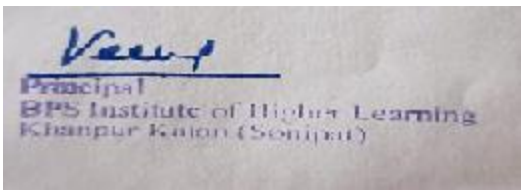
Syllabus of B.Sc. (Medical)
w.e.f. July 2022
(4th Semester)
BOTANY
Paper Code: BOP-202 Practical

L – T – P
- - - - 4

Total Credits: 02
Total Marks: 50

External Marks: 40
Internal Marks: 10

1. Describe and compare the given flowers a & b in semi technical language giving V.S. of flower, T.S.of ovary & floral diagrams with floral formulae. Identify & assign them to their respective families giving reasons
2. Morphological note on the specimens from Angiosperms
3. Identification of slides (from Angiosperms) , & development & embryology) giving reasons.
4. Embryo study by dissecting out the globular/heart shaped embryo from the given plant material.
5. Study of pollen grains by dissecting out the anthers of the given plant material.
6. Note Book (collection & collection report).
7. Viva-voce.



Syllabus of B.Sc. (Medical)
w.e.f. July 2022

(5th Semester)
BOTANY

Paper Code: BOT-301A **Plant Physiology**

L – T – P **Total Credits: 03**
3 - - - - **Total Marks: 50**

External Marks: 40
Internal Marks: 10

Note- Attempt five questions in all, selecting one question from each unit. Question Number 1 is compulsory (short answer type). Nine questions are to be set in total Spread over the entire syllabus. All questions carry equal marks.

Course Objectives: Students study about various metabolic processes like water absorption, mineral nutrition,stomatal functioning, transpiration,flowering, photosynthesis, growth and development etc. which helps in the field of agriculture and horticulture.

Unit - I

Plant Water Relations:-

Importance of water to plant life, physical properties of water, diffusion, osmosis, imbibitions and plasmolysis. Absorption and transport of water, transpiration - types, Physiology of stomata, factors effecting transpiration, importance of transpiration.

Unit- II

Mineral nutrition:-

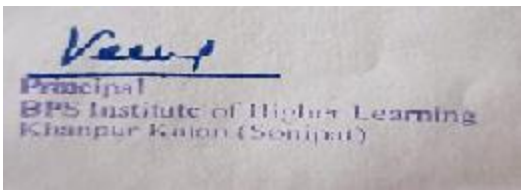
Essential macro and microelements and their role; mineral uptake, deficiency and toxicity symptoms.

Transport of organic substances:-

Mechanism of phloem transport, source-sink relation, factors affecting translocation.

Unit-III

Photosynthesis:- Significance, Historical aspects, photosynthetic pigments, absorption and action spectra, enhancement effect, Concept of two photo systems , Z- Scheme, Photophosphrylation, Calvin cycle, C-4 pathway, CAM plants Photorespiration.



The concept of photoperiodism, physiology of flowering, florigen concept, physiology of senescence, fruit ripning.

Unit- IV

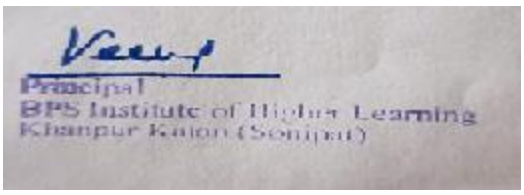
Respiration; ATP as biological energy currency, aerobic and anaerobic respiration, Kreb cycle, electron transport mechanism (chemi-osmotic theory), redox potential, oxidative phosphorylation, pentose phosphate pathway
Seed dormancy, Seed germination, Factors of their regulation, plant movements.

Course Outcomes:

- Impart an insight in to the various plant processes.
- It gives proper knowledge about agriculture and horticulture practices.

Suggested Readings:-

Hopkins, W.G. (1999), Introduction to Plant Physiology. John Wiley and Sons, New York.
Krishanamoorthy, H.N. (1993) Physiology of Plant Growth and Development, Atma Ram & Sons: Delhi .
Kumar, H.D. and Singh, H.N. (1993) . Plant Metabolism (22nd edition), Affiliated East-West Press Pvt. Ltd., New Delhi.
Noggle, G.Ray and Fritz, George, J. (1976) Introductory Plant Physiology. Prentice Hall of India Pvt. Ltd., New Delhi.
Salisbury, Frank, B. and Ross, Clean, (1974). Plant Physiology Prentice Hall of India Pvt, Ltd., New Delhi.
Wilking, M.B. (editer) (1969). Physiology of Plant Growth and Development, Tata McGraw Hill, India.
Galston, A.W. 1989. Life Processes in Plants , Scientific American Library, Springer Verlag, New York.



Syllabus of B.Sc. (Medical)
w.e.f. July 2022
(5th Semester)
BOTANY

Paper Code: BOT-301B Bio-Chemistry and Biotechnology

L – T – P **Total Credits: 03**
3 - - - - Total Marks: 50

External Marks: 40
Internal Marks: 10

Note- Attempt five questions in all, selecting one question from each unit.Question Number 1 is compulsory (short answer type). Nine questions are to be set in total Spread over the entire syllabus. All questions carry equal marks.

Course Objectives: Students study about enzymology,nitrogen and protein metabolism for various biological mechanisms.

Students study about the basic principles and modern age applications of recombinant DNA technology and tissue culture.

Unit- I

Basics of Enzymes:-Discovery and nomenclature; characteristics of enzymes; concept of holoenzyme, apoenzyme, coenzyme and co factor, regulation of enzyme activity; mechanism of action.

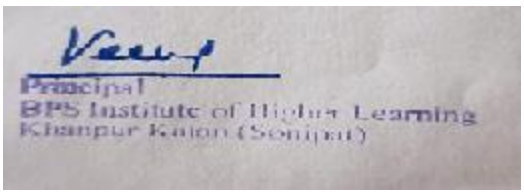
Unit- II

Growth & development –Definitions, phases of growth and development, kinetics of growth.
Growth hormones- History and discovery of plant growth regulators, auxins, gibberellins, cytokinins and abscicic acid, ethylene biosynthesis and mechanism of action of PGRS

Unit-III

Lipid Metabolism- structure and function of lipids, fatty acid biosynthesis; beta-oxidation; saturated and unsaturated fatty acids; storage and mobilization of fatty acids.

Nitrogen Metabolism- Biology of nitrogen fixation; importance of nitrate reductase and its regulation; ammonium-assimilation.



Unit- IV

Genetic engineering and biotechnology-

Tools and techniques of recombinant DNA technology; cloning vectors; genomic and cDNA library. Transposable elements- techniques of gene mapping and chromosome walking.

Plant tissue culture-

Aspects of plant tissue culture, cellular totipotency, differentiation and morphogenesis; biology of *Agrobacterium.*

Transgenic plants; vectors for gene delivery and marker genes.

Course Outcomes:

- The course aims at the concept, scope, instrumentation, basic requirements and applied aspects of plant tissue culture and its types.
- Biochemistry knowledge helps a student in further research field.

Suggested Readings:-

Lehninger, A.L. Nelson, D.V. and Cox M.M. (1993). Principles of Biochemistry. C.B.S.Publishers and distributors, New Delhi.

Lea, P.J. and Leegood, R.C. 1999. Plant biochemistry and Molecular Biology, John Wiley and Sons , Chichester, England,

Vasil, I.K. and Thorpe, T.A. 1994. Plant Cell and Tissue Culture, Kluwer Academic Publishers, The Netherlands.

Bhojwani S.S. 1990, Plant tissue culture: Applications and Limitations. Elsevier Amsterdam, Oxford.

]Bhojwani S.S. and Rajdan M.K. 1983. Plants tissue culture Theory and practice, Elsevier Amsterdam Oxford.

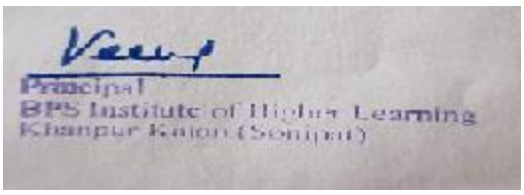
Trehan, Keshav 1994, Biotechnology, Wiley, Eastern New Delhi.

Ranjan, R. 2006. Tarnsgenic Plants Agrobios, India.

Purohit, S.S. 2006. The Gene. Agrobios India.

Joshi, P. 2004. Genetic Engineering and its Application (2Nd Edition). Agrobios India.

Trivedi, P.C. 2005. Advances in Biotechnology. Agrobios India.



Syllabus of B.Sc. (Medical)
w.e.f. July 2022
(5th Semester)
BOTANY

Paper Code: BOP-301 **Practical**

L – T – P
- - - -4

Total Credits: 02
Total Marks: 50

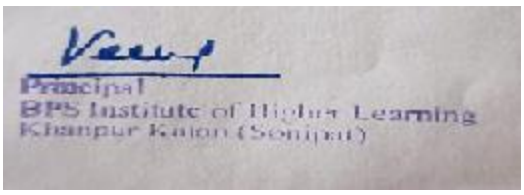
External Marks: 40
Internal Marks: 10

Physiological Experiments and Biochemistry:-

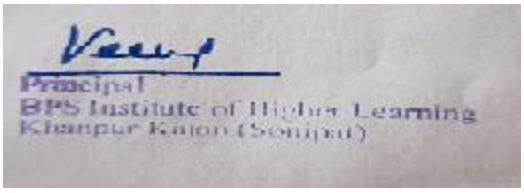
1. Study of plasmolysis and deplasmolysis. Study of osmotic pressure of cell sap and DPD by plasmolytic method.
2. Demonstration of imbibition by plaster of Paris method, study of osmotic phenomenon by potato osmoscope.
3. To measure stomatal frequency and stomatal index by using epidermal peels of leaf.
4. Comparison of stomatal and cuticular transpiration by four leaf /cobalt chloride method.
5. Demonstration of transpiration by Ganongs potometer/ farmers potometer.
6. Separation of plant pigments by paper chromatography/thin layer chromatography.
7. Effect of kind of light intensity and conc. of CO2 on oxygen evolution during photosynthesis using Wilmot's bubbler.
8. Demonstration of aerobic and anaerobic respiration.
9. Evolution of heat during respiration.
10. Biochemical tests of Carbohydrates/Proteins/Lipids.
11. Demonstration of phenomena of fermentation.
12. Experiment on plant movements and growth.
13. Determination of peroxidase activity.
14. To demonstrate amylase activity on starch

Experiments of Biotechnology:-

15. Media preparation, sterilization techniques, demonstration of isolation of tissue/cell and culturing & sub culturing of cell /tissue/organ.
16. To prepare the slants and petriplates for plant tissue culture.
17. Demonstration of anther culture, Protoplast isolation and culture using suitable models/charts/ photographs etc.
18. Demonstration of DNA model.



19. Brief introduction to the components and working of the instruments (Oven autoclave, incubator, Centrifuge, Laminar air flow chamber and spectrophotometer)



Syllabus of B.Sc. (Medical)
w.e.f. July 2022
(6th Semester)
BOTANY

Paper Code: BOT-302A Plant Ecology

L – T – P
3 - - - -

Total Credits: 03
Total Marks: 50

External Marks: 40
Internal Marks: 10

Note- Attempt five questions in all, selecting one question from each unit. Question Number 1 is compulsory (short answer type). Nine questions are to be set in total Spread over the entire syllabus. All questions carry equal marks.

Course Objectives: Students study about importance of resource allocation, energy conservation, global warming, ozone depletion and pollution.

Unit- I

Introduction to Ecology: Definition scope and importance, level of organization Environment: - Introduction; Environmental Factors-Climatic, edaphic factors, Biotic factors, topography.

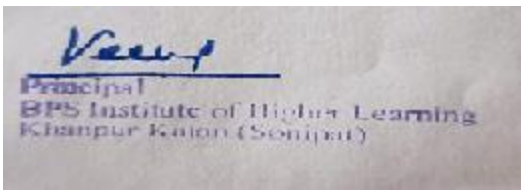
Unit-II

Ecological Adaptations:-Morphological, Anatomical and Physiological responses of plants to water (hydrophytes & Xerophytes), temperature & salinity.
Population Ecology: - Growth curves, Species interactions, Ecotypes, Ecological indicators.

Unit III

Community Ecology:-Community characteristics, frequency, density, cover, life and growth forms, Ecological succession.
Phytogeography: - Biogeographical regions of India, Vegetation types of India, Forest and Grassland. Invasive species (weeds).

Unit-IV



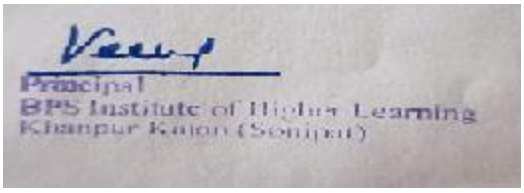
Ecosystem :- Structure, abotic & biotic components, food chain food web, ecological pyramids, ecological energetics, energy flow, biogeochemical cycles of carbon, nitrogen, phosphorus and water.
Environmental Pollution:-Types of pollution, pollutants, acid rain and its effects, effects of pollution on plants
Global change:-Green house effect and green house gases, depletion of ozone layer and climate change,and Carbon trading.

Course Outcomes:

- Ecological studies emphasise on organisms needs, their peaceful existence in environment.
- Having knowledge about plant ecology students get concerned about their nearby environment and make steps towards its improvement.

Suggested Readings:-

Odum, E.P. 1983. Basic Ecology, Saunders, Philadelphia.
Kormondy, E.J. 1996. Concepts of Ecology, Prentice-Hall of India Pvt. Ltd. New Delhi.
Sharma, P.D. (1993) Ecology and Environment. Rastogi Publications, Meerut.
Tyler Miller, Jr. C. 1990. Living in the Environment. Wadworth Publishing Company, Belment, California.
Khopkar, S.M. 1993. Environmental Pollution Analysis Wiley Eastern Ltd. New Delhi.
Misra, R. 1968. Ecology Workbook, Oxford and IBH Publishing Co. New Delhi.
Drummond, J.M.F. 2004. Ecology and Plant Diversities. Agrobios India.
Purohit, S.S. 2004. Environmental Pollution Causes, Effects and Control. Agrobios India.
Deo, P.P.2006. Plant Ecology . Egrobios India.



Syllabus of B.Sc. (Medical)
w.e.f. July 2022
(6th Semester)
BOTANY

Paper Code: BOT-302B Economic Botany

L – T – P
3 - - - -

Total Credits: 03
Total Marks: 50

External Marks: 40
Internal Marks: 10

Note- Attempt five questions in all, selecting one question from each unit. Question Number 1 is compulsory (short answer type). Nine questions are to be set in total Spread over the entire syllabus. All questions carry equal marks.

Course Objectives: Students will know about domestic plant species, their life-cycle, and economic importance of various categories of angiospermic plants.

Unit- I

Food Plants :- Rice, Wheat, Maize, Potato, Sugarcane, their origin and distribution, growing regions, Botanical description, uses , Evolution, improved varieties.
Fibers: - Cotton & Jute, Origin and Distribution, Botanical description, Cultivation, uses, processing, improved verities.

Unit-II

Vegetable oils:-Groundnut mustard and coconut, origin and distribution cultivation, Botanical description, uses & pests, improved verities.

Timber Yielding Plants: - Teak, Sal, Shisham, Chir, Bamboos, Distribution, Botanical description, Cultivation, uses, Seasoning of wood, Characteristics of wood.

Unit-III

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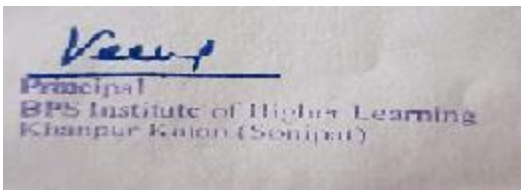
Spices: - General Account of Ginger, Turmeric, Coriander, Clove.
Drugs and Medicinal Plants: - General Account of Sarpagandha, Neem, Belladonna, Cannabis and Opium.



Unit-IV

Beverages: - Tea & Coffee, Origin and Distribution, Cultivation, Botanical description, Uses, Preparation techniques.

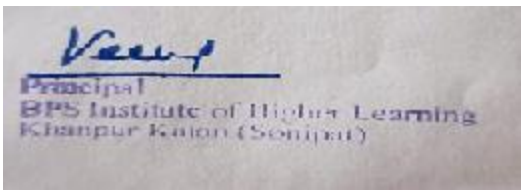
Rubber: - Origin and distribution, Cultivation, Botanical description, Uses, Processing of rubber.

Course Outcomes:

- Knowledge about economic botany increases understanding that how domestication may have changed a plant species over time.
- Students will understand about human plant interactions from a variety of different angles including archaeology, sociology and ecology in addition to basic Botany to help them in explaining these interactions and their effects on plants, society and our dynamic planet.

Suggested Readings:-

Kochhar, S.L.1998. Economic Botany in Tropics, 2nd Edition . Macmillan India Ltd New Delhi.
Sambamurthy, A.V.S.S.and Subramnyan, N.S. 1989. A Textbook Economic Botany. Wiley Eastern Ltd. , New Delhi.
Sharma , O.P. 1996. Hill's Economic Botany . Tata McGraw Hill Co. Ltd., New Delhi.
Simpson, B.B. and Conner-Oghorzaly, M. 1986. Economic Botany-Plants in Our World . McGraw Hill , New York.
Trivedi, P.C. 2006. Medicinal Plants : Ethnobotanical Approach. Agrobios India.
Singh, V.P. 2006. An Introduction to Modern Economic Botany. Agrobios India.



Syllabus of B.Sc. (Medical)
w.e.f. July 2022
(6th Semester)
BOTANY

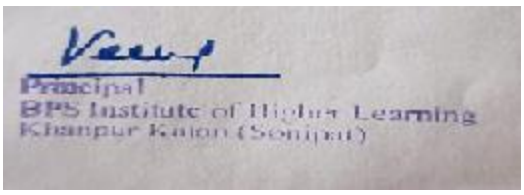
Paper Code: BOP-302 Practical

L – T – P
- - - - 4

Total Credits: 02
Total Marks: 50

External Marks: 40
Internal Marks: 10

1. **Determination of pH of soil and water samples.**
2. Study of community structure by quadrate and line transect methods.
3. Determination of abundance and frequency, density and abundance and IVI of species by quadrate method.
4. Morphological and anatomical features of hydrophytes, xerophytes, halophytes and parasites in relation to their habit and habitat.
5. Preparation of a report on local visit to an industry and agricultural farm to identify the source and types of pollutants.
6. Identification and classification of the various food articles, fibers, oils, timber articles, spices, medicinal plants, rubber plant with reference to their morphology, economic importance and plant part used.
7. Collection | Project report.
8. Viva- Voce.



Bhagat Phool Singh Mahila Vishwavidyalaya, Khanpur Kalan (Sonepat), Haryana-131305

Website : www.bpswomenuniversity.ac.in

Institute of higher learning

(Department of Chemistry)

Curriculum and Scheme of Examination of Three Year B.Sc. (Medical)

(w.e.f. July 2022)

Program code – 054

Principal
BPS Institute of Higher Learning
Khanpur Kalan (Sonipat)

Scheme of Examination
in the subject of Chemistry
(B.P.S.M. Vishwavidhalya, Khanpur Kalan) w.e.f . July 2022

Year I

Semester I:

Sr. No.	Paper Code	Name of Paper	Marks		Periods (in hours)	Credits	ExamTime (in hours)
			Internal Marks	External Marks			
1	CHE 101 A	Inorganic Chemistry	6	27	2	2	3
2	CHE 101 B	Physical Chemistry	7	27	2	2	3
3	CHE 101 C	Organic Chemistry	7	26	2	2	3
4	CHP 101	Chemistry Practical	10	40	4	2	4

Total Marks-=150

Semester 2:

Sr. No.	Paper Code	Name of Paper	Marks		Periods (in hours)	Credits	ExamTime (in hours)
			Internal Marks	External Marks			
1	CHE 102 A	Inorganic Chemistry	6	27	2	2	3
2	CHE 102 B	Physical Chemistry	7	27	2	2	3
3	CHE 102 C	Organic Chemistry	7	26	2	2	3
4	CHP 102	Chemistry Practical	10	40	4	2	4

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Total Marks-=150

Year II

Semester 3:

Sr. No.	Paper Code	Name of Paper	Marks		Periods (in hours)	Credits	ExamTime (in hours)
			Internal Marks	External Marks			
1	CHE 201 A	Inorganic Chemistry	6	27	2	2	3
2	CHE 201 B	Physical Chemistry	7	27	2	2	3
3	CHE 201 C	Organic Chemistry	7	26	2	2	3
4	CHP 201	Chemistry Practical	10	40	4	2	4

Total Marks-=150

Semester 4:

Sr. No.	Paper Code	Name of Paper	Marks		Periods (in hours)	Credits	ExamTime (in hours)
			Internal Marks	External Marks			
1	CHE 202 A	Inorganic Chemistry	6	27	2	2	3
2	CHE 202 B	Physical Chemistry	7	27	2	2	3
3	CHE 202 C	Organic Chemistry	7	26	2	2	3
4	CHP 202	Chemistry Practical	10	40	4	2	4

Total Marks-=150

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Year III

Semester 5:

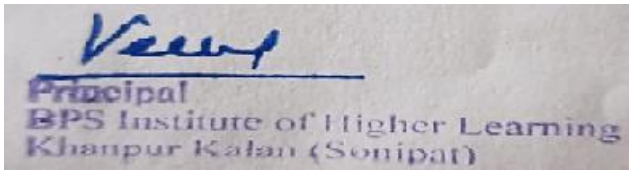
Sr.No.	Paper Code	Name of Paper	Marks		Periods (in hours)	Credits	ExamTime (in hours)
			Internal Marks	External Marks			
1	CHE 301 A	Inorganic Chemistry	6	27	2	2	3
2	CHE 301B	Physical Chemistry	7	27	2	2	3
3	CHE 301 C	Organic Chemistry	7	26	2	2	3
4	CHP 301	Chemistry Practical	10	40	4	2	4

Total Marks-=150

Semester 6:

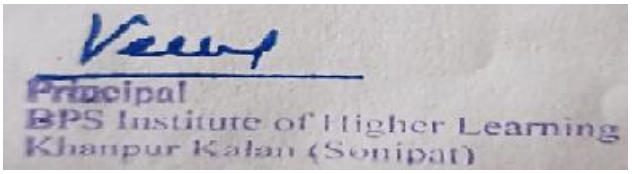
Sr. No.	Paper Code	Name of Paper	Marks		Periods (in hours)	Credits	ExamTime (in hours)
			Internal Marks	External Marks			
1	CHE 302 A	Inorganic Chemistry	6	27	2	2	3
2	CHE 302 B	Physical Chemistry	7	27	2	2	3
3	CHE 302C	Organic Chemistry	7	26	2	2	3
4	CHP 302	Chemistry Practical	10	40	4	2	4

Total Marks-=150



Programme Outcomes (PO) for Under Graduate Programmes of B.Sc. (Medical)

PO1	Knowledge	Capable of demonstrating comprehensive disciplinary knowledge gained during course of study
PO2	Communication	Ability to communicate effectively on general and scientific topics with the scientific community and with society at large
PO3	Problem Solving	Capability of applying knowledge to solve scientific and other problems
PO4	Individual and Team Work	Capable to learn and work effectively as an individual , and as a member or leader in diverse teams, multidisciplinary settings
PO5	Investigation of Problems	Ability of critical thinking, analytical reasoning and research based knowledge including design of experiments, analysis and interpretation of data to provide conclusions
PO6	Modern Tool usage	Ability to use and learn techniques, skills and modern tools for scientific practices
PO7	Science and Society	Ability to apply reasoning to assess the different issues related to society and the consequent responsibilities relevant to the professional scientific practices
PO8	Life-Long Learning	Aptitude to apply knowledge and skills that are necessary for participating in learning activities throughout life
PO9	Environment and Sustainability	Ability to design and develop modern systems which are environmentally sensitive and to understand the importance of sustainable development
PO10	Ethics	Apply ethical principles and professional responsibilities in scientific practices
PO11	Project Management	Ability to demonstrate knowledge and understanding of the scientific principles and apply these to manage projects



PROGRAMME SPECIFIC OUTCOMES OF B.Sc. (Medical)

PSO1 Acquire good knowledge about the fundamentals and applications of chemical and scientific theories.

PSO2 All branches of Science and Technology are related to Chemistry.

PSO3 Easily assess the properties of all elements discovered.

PSO4 Will become familiar with the different branches of chemistry like analytical, physical, organic, inorganic, environmental and polymer.

PSO5 Will help in understanding the causes of environmental pollution and can open up new methods to control environmental pollution.

PSO6 Will develop analytical skills and problem-solving skills requiring application of chemical principles.

PSO7 Have the ability to synthesize, separate and characterize compounds using laboratory and instrumentation techniques.

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B. Sc. Ist Year (Ist Semester)

Paper - Inorganic Chemistry **Max. Marks: 27**
CHE-101 A **Time: 3 Hrs.**

Note: Examiner will set nine questions and the candidates will be to attempt five questions in all .Question number one wiil be compulsory covering the entire syllabus and will be of seven marks. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each section which will be of five marks each.

Course objectives: The aim of the course is intended to provide the knowledge of

- Atomic structure
- Periodic properties
- Bonding in molecules

Section-A

Atomic Structure

Idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s, p, d orbitals.

Section-B

Periodic Properties

General principles of periodic table .Aufbau and Pauli exclusion principles, multiplicity rule .Electronic configurations of the elements, effective nuclear charge, Slater's rules. Atomic and ionic radii , ionization energy, electron affinity and electronegativity definition , methods of determination or evaluation, trends in periodic table (in s, p block elements).

Section-C

Covalent Bond

Valence bond theory and its limitations , directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions (BeF_2, BF_3, CH_4, PF_5, SF_6,

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IF_7 SO_4^{2-}, ClO_4^-) Valence shell electron pair repulsion (VSEPR) theory to NH_3, H_3O^+, SF_4, CIF_3, ICI_2^- and H_2O. MO theory of heteronuclear (CO and NO) diatomic molecules,bond strength and bond energy, pe rcen tage ionic character from dipole moment and electronegativity difference.

Section-D

Ionic Solids

Io nic structures (NaCl,CsCl,ZnS(Zinc Blende), CaF_2) radius ratio effect and coord ination number, limitation of rad ius ratio rule, lattice defects, semicond uc tors, lattice energy (methamtical derivation excluded) and Born-Haber cycle, solvation energy and its relation with solubility of ionic solids, polarizing power and polarisability of ions, Fajans rule.

Course outcome: The students will be able to

- know the idea of de-Broglie equation and Heisenberg's uncertainty principal
- Understand the quantum numbers and principal of extra stability.
- Understand the periodic properties of elements in periodic table.
- Explain the VBT and MOT of different molecule.
- Discuss the alkali and alkaline earth metal with their properties.

Reference Books:

- Lee, J.D. *Concise Inorganic Chemistry* ELBS, 1991.
- Cotton, F.A., Wilkinson, G. &Gaus, P.L. *Basic Inorganic Chemistry*, 3rd ed., Wiley.
- Douglas, B.E., McDaniel, D.H. & Alexander, J.J. *Concepts and Models in Inorganic Chemistry*, John Wiley & Sons.
- Huheey, J.E., Keiter, E.A., Keiter, R.L. & Medhi, O.K. *Inorganic Chemistry:Principles of Structure and Reactivity*, Pearson Education India, 2006.
- Pradeep's inorganic chemistry, Volume I.
- R Chand, inorganic chemistry, Volume I.
- Modern publications,inorganic chemistry, Volume I.

B. Sc. Ist Year (Ist Semseter)

Paper - Physical Chemistry

CHE-101 B **Marks: 27**

Time: 3 hrs.

Note: Examiner will set nine questions and the candidates will be required to attempt five questions in all.Question number one will be compulsory covering the entire syllabus and will be of seven marks. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each section which will be of five marks each.

Course objectives: The aim of the course is intended to provide the knowledge of

- Gaseous , liquid and solid states
- Critical phenomenon
- Liquid crystals

Section – A

Gaseous States

Maxwell's distribution of velocities and energies (derivation excluded) Calculation of root mean square velocity, average velocity and most probable velocity. Collision diameter, collision number, collision frequency and mean free path. Deviation of Real gases from ideal behaviour. Derivation of Vander Waal's Equation of State, its application in the calculation of Boyle's temperature (compression factor) Explanation of behaviour of real gases using Vander Waal's equation.

Secton-B

Critical Phenomenon:

Critical temperature, Critical pressure ,critical volume and their determination .PV isotherms of real gases, continuity of states, the isotherms of Vander Waal's equation, relationship between critical constants and Vander Waal's constants. Critical compressibility factor. The Law of corresponding states.

Lequifaction of gases.

Section-C

Liquid States

Structure of liquids. Properties of liquids – surface tens ion

,viscosity vapour pressure and optical rotations and their

determination.

Sec tion-D

Solid State

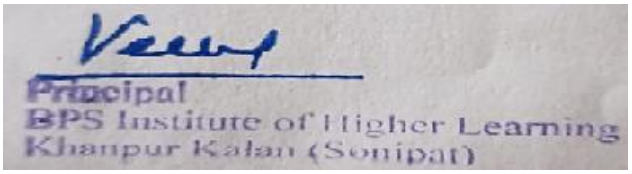
Classification of solids, Laws of crystallography – (i) Law of constancy of interfacial angles (ii) Law of rationality of indices (iii) Law of symmetry. Symmetry elements of crystals. Definition of unit cell & space lattice. Bravais lattices, crystal system. X-ray diffraction by crystals. Derivation of Bragg equation.De termination of crystal structure of NaCl, KCl. Liquid crystals: Difference between solids, liquids and liquid crystals,types of Liquid crystals. Applications of liquid crystal

Course outcome: The students will be able to

- Know about Maxwell's distribution of various velocities, behavior of real and ideal gas and deviation of real gases from ideal behavior, Vander waal equation and it's applications.
- Understand about critical constant, it's derivation and of liquefaction of gases.
- know about structure of liquids with their properties like surface tension, viscosity,vapoue pressure and optical rotation know about solids, there types ,symmetry elements of crystals, unit cell and space lattice.
- Determine the internal structure of crystal by Bragg's equation and liquid crystals.

Reference Books:

- Barrow, G.M. *Physical Chemistry* Tata McGraw-Hill (2007).
- Castellan, G.W. *Physical Chemistry* 4th Ed. Narosa (2004).
- B. R. Puri, Madan S. Pathania , L. R. Sharma *Principles of Physical Chemistry, 48th Ed.,* Vishal Publications.
- Peter Atkins , Julio de Paula , James Keeler *Atkins' Physical Chemistry*, Oxford University Press.



B. Sc. Ist Year (Ist Semester)

Paper -Organic Chemistry **Max. Marks: 26**
CHE -101C **Time: 3 Hrs.**

Note: Examiner will set nine questions and the candidates will be required to attempt five questions in all. Question number one will be compulsory covering the entire syllabus and will be of six marks. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each section which will be of five marks each.

Course objectives: The aim of the course is intended to provide the knowledge of

- Bonding in organic compounds
- Stereochemistry of organic compounds
- Mechanism of organic reactions
- Saturated hydrocarbons

Section-A

1. Structure and Bonding

Localized and delocalized chemical bond, van der Waals interactions, resonance: conditions, resonance effect and its applications, hyperconjgation, inductive effect, Electromeric effect & their comparison.

2. Stereochemistry of Organic Compounds–I

Concept of isomerism. Types of isomerism. Optical isomerism, elements of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, threo and erythro diastereomers, meso-compounds, resolution of enantiomers, inversion, retention and racemization.

Section-B

Stereochemistry of Organic Compound

Relative and absolute configuration, sequence rules, R & S systems of nomenclature. Geometric isomerism, determination of configuration of geometric isomers. E & Z system of nomenclature ,Conformational isomerism, conformational analysis of ethane and n-butane, conformations of cyclohexane, axial and equatorial bonds,. Newman projection and Sawhorse formulae, Difference between configuration and conformation.

Section-C

Mechanism of Organic Reactions

Curved arrow notation, drawing electron movements with arrows, half-headed and double-headed arrows, homolytic and heterolytic bond breaking.Types of reagents – electrophiles and nucleophiles. Types of organic reactions. Energy considerations. Reactive intermediates carbocations, carbanions, free radicals, carbenes ,arynes and nitrenes (formation, structure & stability). Assigning formal charges on intermediates and other ionic species.

Section-D

Alkanes and Cycloalkanes

IUPAC nomenclature of branched and unbranched alkanes, the alkyl group, classification of carbon atoms in alkanes. Isomerism in alkanes, sources, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids), physical properties .Cycloalkanes : nomenclature, synthesis of cycloalkanes and their derivatives –photochemical (2+2) cycloaddition reactions, , dehalogenation of α,ω-dihalides, , pyrolysis of calcium or barium salts of dicarboxylic acids, Baeyer's strain theory and its limitations., theory of strainless rings.

Course outcome: The students will be able to

- Understand delocalisation,vander waal forces, resonance, hyperconjugation, inductive and

1 To understand delocalisation,vander waal forces, resonance, hyperconjugation, inductive and electromeric effect.To knows the basic concept of isomerism and concept of chirality.Distereomerism,meso compounds,racemisation,resolution.

electromeric effect.
- Knows the basic concept of isomerism and concept of chirality.Distereomerism,meso compounds,racemisation,resolution.

- Understand R & S system, E &Z system,geometrical and conformational isomerism with conformational analysisTo understand types of reagents, types of reactions,reactive intermediates.
- Understand the preparation and properties of alkanes and cycloalkanes with Baeyer's Strain theory.

Reference Books:

- Graham Solomon, T.W., Fryhle, C.B. &Dnyder, S.A. *Organic Chemistry*, John Wiley & Sons (2014).
- McMurry, J.E. *Fundamentals of Organic Chemistry*, 7th Ed. Cengage Learning India Edition, 2013.
- Sykes, P. *A Guidebook to Mechanism in Organic Chemistry*, Orient Longman, New Delhi (1988).
- Eliel, E.L. *Stereochemistry of Carbon Compounds*, Tata McGraw Hill education, 2000.
- Finar, I.L. *Organic Chemistry* (Vol. I & II), E.L.B.S.
- Morrison, R.T. & Boyd, R.N. *Organic Chemistry*, Pearson, 2010.
- Bahl, A. &Bahl, B.S. *Advanced Organic Chemistry*, S. Chand, 2010.
- Pradeep's organic chemistry, Volume I, II
- R Chand, organic chemistry, Volume I,II
- Modern publications, organic chemistry, Volume -I
- New Age International (P) Ltd, Publishers, Volume I,II.

B.Sc. I Year(1st sem)

Practical (CHP- 101)

Max. Marks: 50 [10(int.)+40(ext.)]

Time: 4 Hrs.

Course objectives: The aim of the course is intended to make the students capable to perform

- volumetric titrations
- kinetic study of first order reactions
- preparation of sol

Section-A (Inorganic)

Volumetric Analysis

1. Redox titrations: Determination of Fe^{2+}, $C_2O_4^{2-}$(using $KMnO_4$, $K_2Cr_2O_7$)

2. Complexometric titrations: Determination of Mg^{2+}, Zn^{2+} by EDTA.

Section-B (Physical)

1. To determine the specific reaction rate of the hydrolysis of methyl

Acetate /ethyl acetate catalyzed by hydrogen ions at room temperature.

2. To prepare arsenioussulphide sol and compare the precipitating power of

mono-, bi – and trivalent anions.

SECTION – C (Organic)

1. Preparation and purification through crystallization or

distillation and ascertaining their purity through melting point

or boiling point

(i) Iodoform from ethanol (or acetone)

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(ii) m-Dinitrobenzne from nitrobenzene (use 1:2 conc. HNO_3 -

H_2SO_4mixture if fuming $HNO_3$is not available)

2. To study the process of sublimation of camphor .

Course outcome: The students will be able to

- understand the weighing of substances, preparation of standard solutions and to run redox and complexometric titrations.
- study the kinetics of first order chemical reaction, preparation of colloidal sol and study of its precipitation power.
- know about the preparation and purification of iodoform and meta dinitrobenzene.

Books suggested:-

1. A. D. Chawla , New College Practical Chemistry ,B.Sc. -1 , Vijay Pub. 2011.

2. V. Alexeyev ,Quantative Analysis , Mir Pub. Moscow.

3. S.C. Kheterpal ,S.N. Dhawan ,P.N. Kapil : Advanced Practical Chemistry , Vol -1 ,2011.

4. R.L. Madan ,Practical Chemistry ,B.Sc. Part-1.

B. Sc. Ist Year (IInd Semester)

Paper -Inorganic Chemistry **Max. Marks: 27**
CHE-102 A **Time: 3 Hrs.**

Note: Examiner will set nine questions and the candidates will be required to attempt five questions in all. Question number one will be compulsory covering the entire syllabus and will be of seven marks. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each section which will be of five marks each.

Course objectives: The aim of the course is intended to provide the knowledge of

- Different types of bonding in compounds
- Semiconductors
- Elements of periodic table(s and p block)

Section-A

Hydrogen Bonding & Vander Waals Forces

Hydrogen Bonding – Definition, Types, effects of hydrogen bonding on properties of substances, application

Brief discussion of various types of Vander Waals Forces

Metallic Bond and Semiconductors

Metallic Bond- Brief introduction to metallic bond, band theory of metallic bond

Semiconductors- Introduction, types and applications.

Section-B

s-Block Elements

Comparative study of the elements including, diagonal

relationships, salient features of hydrides (methods of preparation excluded), solvation and complexation tendencies including their function in biosystems.

Chemistry of Noble Gases

Chemical properties of the noble gases with emphasis on their low chemical reactivity, chemistry of xenon, structure and bonding of fluorides, oxides & oxyfluorides of xenon.

SECTION – C

p-Block Elements

Emphasis on comparative study of properties of p-block elements (including diagonal relationship and excluding methods of preparation).

Boron family (13th gp):-

Diborane – properties and structure (as an example of electron – deficient compound and multicentre bonding), Borazene – chemical properties and structure Trihalides of Boron – Trends in lewis acid character structure of aluminium (III) chloride.

Carbon Family (14th group) _

Catenation, $p\pi$– $d\pi$ bonding (an idea), carbides, fluorocarbons, silicates (structural aspects), silicons – general methods of preparations, properties and uses.

Section-D

Nitrogen Family (15th group)

Oxides – structures of oxides of N, P oxoacids – structure and relative acid strengths of oxoacids of Nitrogen and phosphorus. Structure of white, yellow and red phosphorus.

Oxygen Family (16th group)

Oxyacids of sulphur – structures and acidic strength H_2O_2 – structure, properties and uses.

Halogen Family (17th group)

Basic properties of halogen, interhalogens types properties, hydro and oxyacids of chlorine – structure and comparison of acid strength.

Course outcome: The students will be able to

- Knows the idea of hydrogen bonding, its types and applications.
- understand the concept of vander waal forces.
- understand the metallic bond, band theory theory and semiconductors.
- explain the properties of s -block elements and noble gases.
- discuss the properties of p- block elements.

Reference readings

- Lee, J.D. *Concise Inorganic Chemistry* ELBS, 1991.
- Cotton, F.A., Wilkinson, G. &Gaus, P.L. *Basic Inorganic Chemistry*, 3rd ed., Wiley.
- Douglas, B.E., McDaniel, D.H. & Alexander, J.J. *Concepts and Models in Inorganic Chemistry*, John Wiley & Sons.
- Huheey, J.E., Keiter, E.A., Keiter, R.L. & Medhi, O.K. Inorganic Chemistry:Principles of Structure and Reactivity, Pearson Education India, 2006.
- Pradeep's inorganic chemistry, Volume I.
- R Chand, inorganic chemistry, Volume I.
- Modern publications,inorganic chemistry, Volume II.

B. Sc. Ist Year (IInd Semester)

Paper- Physical Chemistry

CHE-102B

Marks: 27
Time: 3 Hrs.

Note: Examiner will set nine questions and the candidates will be required to attempt five questions in all. Question number one will be compulsory covering the entire syllabus and will be of seven marks. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each section which will be of five marks each.

Course objectives: The aim of the course is intended to provide the knowledge of

- Kinetics of the reactions
- Concepts of electrochemistry

Section – A

Kinetics-I

Rate of reaction, rate equation, factors influencing the rate of a reaction – concentration, temperature, pressure, solvent, light, catalyst. Order of a reaction, integrated rate expression for zero order, first order, second and third order reaction. Half life period of a reaction. Methods of determination of order of reaction,

Section – B

Kinetics-II

Effect of temperature on the rate of reaction – Arrhenius equation. Theories of reaction rate – Simple collision theory for

unimolecular and bimolecular collision. Transition state theory of Bimolecular reactions.

Section-C

Electrochemistry-I

Electrolytic conduction, factors affecting electrolytic conduction, specific, conductance, molar conductance,equivalent conductance and relation among them, their vartion with concentration. Arrhenius theory of ionization, Ostwald's Dilution Law. Debye-Huckel – Onsager's equation for strong electrolytes (elementary treatment only) Transport number, definition and determination by Hittorfs methods, (numerical included),

Section-D

Electrochemistry-II

Kohlarausch's Law, calculation of molar ionic conductance and effect of viscosity temperature & pressure on it. Application of Kohlarausch's Law in calculation of conductance of weak electrolytes at infinite dilution. Applications of conductivity measurements: determination of degree of dissociation, determination of K_a of acids determination of solubility product of sparingly soluble salts, conductometric titrations. Definition of pH and pK_a, Buffer solution, Buffer action, Henderson – Hazel equation, Buffer mechanism of buffer action.

Course outcome: The students will be able to

- Know about reaction rate, factors affecting rate of reaction, rate constant and half life period for zero, first, second and third order reactions. Method for the determination of order of reactions.
- Understand about Arrhenius equation, theories of reaction rate and transition state theory of bimolecular reaction
- Know about electrolytic conduction, factors affecting it, specific conductance, molar conductance, equivalent conductance, Debye-Huckel-Onsagar's equation.
- Determine the transport numbers by using Hittorf's method.
- Kohlarausch's Law and buffer solutions.

. .

Reference Books:

- Barrow, G.M. *Physical Chemistry* Tata McGraw-Hill (2007).
- Castellan, G.W. *Physical Chemistry* 4th Ed. Narosa (2004).
- B. R. Puri, Madan S. Pathania , L. R. Sharma*Principles of Physical Chemistry* Vishal Publications.
- Peter Atkins , Julio de Paula , James Keeler *Atkins' Physical Chemistry*, Oxford University Press.
- K.J. Laidler, *Chemical Kinetics*, Perason.

B. Sc. Ist Year (IInd Semester)

Paper -Organic Chemistry **Max. Marks: 26**
CHE-102 C **Time: 3 Hrs.**

Note: Examiner will set nine questions and the candidates will be required to attempt five questions in all. Question number one will be compulsory covering the entire syllabus and will be of six marks. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each section which will be of five marks each.

Course objectives: The aim of the course is intended to provide the knowledge of

- Unsaturated aliphatic hydrocarbons
- Aromatic hydrocarbons
- Haloalkanes and haloarenes.

Section-A

Alkenes

Nomenclature of alkenes, , mechanisms of dehydration of alcoholsand dehydrohalogenation of alkyl halides,. The Saytzeff rule Hofmann elimination, physical properties and relative stabilitiesof alkenes Chemical reactions of alkenes mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration oxidation, oxymercuration -reduction, ozonolysis, hydration, hydroxylation and oxidation with $KMnO_4$,

Section-B

.Arenes and Aromaticity

Nomenclature of benzene derivatives:. Aromatic nucleus and side chain. Aromaticity: the Huckel rule, aromatic ions, annulenes up

to 10 carbon atoms, aromatic, anti - aromatic and non – aromatic

Aromatic electrophilic substitution , general pattern of the mechanism, mechansim of nitration, halogenation, sulphonation, and Friedel-Crafts reaction. Energy profile diagrams. Activating , deactivating substituents and orientation.

Section-C

Dienes and Alkynes

Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes. Structure of butadiene,. Chemical reactions , 1,2 and 1,4 additions (Electrophilic & free radical mechanism), Diels-Alder reaction, Nomenclature, structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions, hydroboration-oxidation of alkynes,

Section-D

Alkyl and Aryl Halides

Nomenclature and classes of alkyl halides, methods of formation ,chemical reactions. Mechanisms and stereochemistry of nucleophilic substitution reactions of alkyl halides, S_N2 and S_N1 reactions with energy profile diagrams. Methods of formation and reactions of aryl halides, The addition-elimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions. Relative reactivities of alkyl halides vs allyl, vinyl and aryl halides.

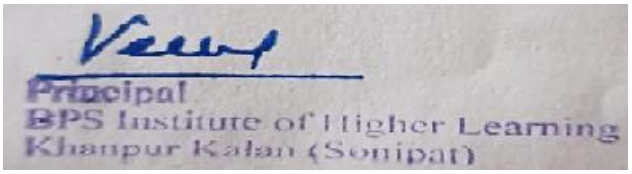
Course outcome: The students will be able to

- understand the preparations and properties of alkenes.
- Know about aromaticity, Huckel's rule and types and mechanism electrophilic substitution reactions of arenes.

- understand the preparations and properties of dienes and alkynes.
- understand the preparations and properties of alkyl and aryl halide including S_N1, S_N2, addition-elemination and elimination-addition reaction mechanism.

Reference Books:

- Graham Solomon, T.W., Fryhle, C.B. &Dnyder, S.A. *Organic Chemistry,* John Wiley & Sons (2014).
- McMurry, J.E. *Fundamentals of Organic Chemistry*, 7th Ed. Cengage Learning India Edition, 2013.
- Sykes, P. *A Guidebook to Mechanism in Organic Chemistry*, Orient Longman, New Delhi (1988).
- Finar, I.L. *Organic Chemistry* (Vol. I & II), E.L.B.S.
- Morrison, R.T. & Boyd, R.N. *Organic Chemistry*, Pearson, 2010.
- Bahl, A. &Bahl, B.S. *Advanced Organic Chemistry*, S. Chand, 2010.
- Kotz, J.C., Treichel, P.M. & Townsend, J.R. *General Chemistry* Cengage Learning India Pvt. Ltd., New Delhi (2009).
- Mahan, B.H. *University Chemistry* 3rd Ed. Narosa (1998).
- Petrucci, R.H. *General Chemistry* 5th Ed. Macmillan Publishing Co.: New York (1985).
- Pradeep's organic chemistry, Volume I & II.
- R Chand, organic chemistry, Volume I & II.
- Modern publications, organic chemistry, Volume- II.
- New Age International (P) Ltd, Publishers, Volume I, II.



B.Sc. I (2^{nd}sem)

Practical CHP-102

Max. Marks: 50 [10(int.)+40(ext.)]

Time: 4 Hrs.

Course objectives: The aim of the course is intended to provide the knowledge of

- Iodometric titration
- Applications of chromatography
- To study physical properties of liquids
- Synthesis of organic compounds.

Section-A (Inorganic)

Volumetric Analysis

1. Iodometic titrations: Determination of Cu^{2+} (using standard hypo Solution).

2. Paper Chromatography

3. Qualitative Analysis of the any one of the following Inorganic cations and anions by paper chromatography (Pb^{2+} Cu^{2+}, Ca^{2+} Ni^{2+}, Cl^- Br^-, I^- and PO_4^{3-} and NO_3^-).

Section-B (Physical)

1. To determine the surface tension of a given liquid by drop number method.

2. To determine the viscosity of a given liquid**.**

3. To determine the specific refractivity of a given liquid

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SECTION – C (Organic)

1. Preparation and purification through crystallization or

distillation and ascertaining their purity through melting point

or boiling point.

i) p - Bromoacetanilide from acetanilide

ii) Dibenzalaceton from acetone and benzaldehyde

iii) Aspirin from salicylic acid.

iv) To study the process of sublimation of phthalic

acid.

Course outcome: The students will be able to

- Understand iodometric titration and paper chromatography.
- Determine the surface tension ,viscosity and refractive index
- Study the preparation and purification of p-Bromoacetanilide, Dibenzalacetone and asprin.

Books Suggested:-

1. A. D. Chawla , New College Practical Chemistry ,B.Sc. -1 , Vijay Pub. 2011.

2. V. Alexeyev ,Quantative Analysis ,Mir Pub. Moscow.

3. S.C. Kheterpal,S.N. Dhawan ,P.N. Kapil : Advanced Practical Chemustry, Vol -1

4.R.L. Madan ,Practical Chemistry ,B.Sc. Part-I

B.Sc. II Year (IIIrd Semester)

Paper - Inorganic Chemistry **Max. Marks: 27**

CHE-201A **Time: 3 Hrs.**

Note: Examiner will set nine questions and the candidates will be required to attempt five questions in all. Question number one will be compulsory covering the entire syllabus and will be of seven marks. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each section which will be of five marks each.

Course objectives: The aim of the course is intended to provide the knowledge of

- Transition elements
- Coordination compounds
- Non aqueous solvents.

Section-A

Chemistry of Elements of Ist transition series:

Definition of transition elements, position in the periodic table, General characteristics & properites of Ist transition elements,. Structures & properties of some compounds of transition elements – TiO_2, $VOCl_2$, $FeCl_3$, $CuCl_2$ and $Ni(CO)_4$

Section-B

Chemistry of Elements of IInd & IIIrd transition series

General characteristics and properties of the IInd and IIIrd

transition elements Comparison of properties of 3d elements with 4d & 5d elements with reference only to ionic radii, oxidation state, magnetic and Spectral properties and stereochemistry

Section-C

Coordination Compounds

Werner's coordination theory, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes

Section-D

Non-aqueous Solvents

Physical properties of a solvent, types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NH_3 and liquid SO_2.

Course outcome: The students will be able to

- Understand the chemistry of elements of 3d series transition elements.
- Study the comparision of properties of 4d and 5d series transition elemrnts with 3d series transition elements..
- Study the Werner's theory,VBT,EAN rule,structural and streoisomerism in coordination compounds
- Explain the non aqueous solvents, there types,various reaction of liquid ammonia and sulphur dioxide.

Reference Books :

- Lee, J.D. *Concise Inorganic Chemistry* ELBS, 1991.
- Cotton, F.A., Wilkinson, G. &Gaus, P.L. *Basic Inorganic Chemistry*, 3rd ed., Wiley.
- Douglas, B.E., McDaniel, D.H. & Alexander, J.J. *Concepts and Models in Inorganic Chemistry*, John Wiley & Sons.
- Huheey, J.E., Keiter, E.A., Keiter, R.L. & Medhi, O.K. Inorganic Chemistry:Principles of Structure and Reactivity, Pearson Education India, 2006.
- Pradeep's inorganic chemistry, Volume II.
- R Chand, inorganic chemistry, Volume II.
- Modern publications, inorganic chemistry, Volume III.

B. Sc. IInd Year (IIIrd Semester)

Paper - Physical Chemistry

CHE-201B

Max.Marks: 27
Time: 3 Hrs.

Note: Examiner will set nine questions and the candidates will be required to attempt five questions in all. Question number one will be compulsory covering the entire syllabus and will be of seven marks. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each section which will be of five marks each.

Course objectives: The aim of the course is intended to provide the knowledge of

- Thermodynamics
- Chemical equilibrium
- Distribution law

SECTION – A

Thermodynamics-I

Definition of thermodynamic terms: system surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Concept of heat and work.

Zeroth Law of thermodynamics, First law of thermodynamics: statement, definition of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's law – Joule – Thomson coefficient for ideal gass and real gas: and inversion temperature.

SECTION – B

Thermodynamics-II

Calculation of w.q. dU & dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process, Temperature dependence of enthalpy, Kirchffs equation.

Bond energies and applications of bond energies.

SECTION – C

Chemical Equilibrium

Equilibrium constant and free energy, concept of chemical potential, Thermodynamic derivation of law of chemical equilibrium. Temperature dependence of equilibrium constant; Van't Hoff reaction isochore, Van't Hoff reaction isotherm. Le-Chatetier's principle and its applications Clapeyron equation and Clausius – Clapeyron equation its applications.

SECTION – D

Distributioln Law

Nernst distribution law – its thermodynamic derivation ,Modification of distribution law when solute undergoes dissociation, association and chemical combination. Applications of distribution law: (i) Determination of degree of hydrolysis and hydrolysis constant of aniline hydrochloride. (ii) Determination of equilibrium constant of potassium tri-iodide complex and process

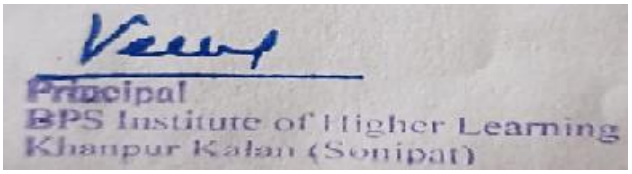
of extraction.

Course outcome: The students will be able to

- Know about the various thermodynamic systems,intensive and extensive properties,thermodynamic process,Zeroth law, Joule's law ,Joule-Thomson coefficient and inversion temperature.
- Calculate w,q,ΔU,ΔH under isothermal, adiabetic conditions study Kirchff's equation and its application of bond energy.
- Study the Vant Hoff's reaction, Le Chaelier's principle , Clausius-Clapeyron equation and its applications.
- Study Nernst distribution law,modification of distribution law and applications of distribution law.

Reference Books:

- Barrow, G.M. *Physical Chemistry* Tata McGraw-Hill (2007).
- Castellan, G.W. *Physical Chemistry* 4th Ed. Narosa (2004).
- B. R. Puri, Madan S. Pathania , L. R. Sharma*Principles of Physical Chemistry* Vishal Publications.
- Peter Atkins , Julio de Paula , James Keeler *Atkins' Physical Chemistry*, Oxford University Press.
- S.Glasstone, *An Introduction To Electrochemistry,* Affiliated East- West Press Pvt. Limited, New Delhi.
- S. Glasstone *Thermodynamics For Chemists.*



B. Sc. IInd Year (IIIrd Semester)

Paper - Organic Chemistry **Max. Marks: 26**
CHE-201C **Time: 3 Hrs.**

Note: Examiner will set nine questions and the candidates will be required to attempt five questions in all. Question number one will be compulsory covering the entire syllabus and will be of six marks. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each section which will be of five marks each.

Course objectives: The aim of the course is intended to provide the knowledge of

- Alcohols
- Phenols
- Carboxylic acids and derivatives
- UV spectroscopy

Section-A

1. Alcohols

Monohydric alcohols , nomenclature, methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding. Acidic nature. Reactions of alcohols.Dihydric alcohols — nomenclature, methods of formation,

chemical reactions of vicinal glycols, oxidative cleavage [$Pb(OAc)_4$ and HIO_4] and pinacol –pinacolone rearrangement.

2. Epoxides

Synthesis of epoxides. Acid and base-catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides

Section-B

Phenols

Nomenclature, structure and bonding. Preparation of phenols, physical properties and acidic character. Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion. Reactions of phenols — electrophilic aromatic substitution, Mechanisms of Fries rearrangement, Claisen rearrangement, Reimer-Tiemann reaction, Kolbe's reaction and Schotten and Baumann reactions.

Section-C

Ultraviolet (UV) absorption spectroscopy

Absorption laws (Beer-Lambert law), molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions, effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. UV spectra of conjugated enes and enones,Woodward- Fieser rules, calculation of λ_{max} of simple conjugated dienes and α,β-unsaturated ketones. Applications of UV Spectroscopy in structure elucidation of simple organic compounds.

Section-D

.Carboxylic Acids & Acid Derivatives

Nomenclature of Carboxylic acids, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Preparation of carboxylic acids. Reactions of carboxylic acids. Hell-Volhard-Zelinsky reaction. Reduction of carboxylic acids. Mechanism of decarboxylation.

Structure , nomenclature and preparation of acid chlorides, esters, amides and acid anhydrides. Relative stability of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acylsubstitution.

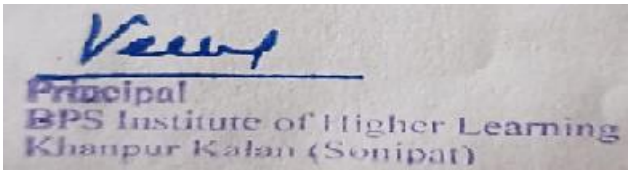
Mechanisms of esterification and hydrolysis (acidic and basic).

Course outcome: The students will be able to

- Understand the methods of preparations and properties of alcohols,glycol,epoxide,pinacol-pinacolone rearrangement, ring opening of epoxides and Grignard's reagents.
- Understand the methods of preparations and properties of phenols.
- Study the principle,presentation and analysis of UV spectra,structure elucidation of simple organic compound using UV spectroscopy.
- Understand the methods of preparations and properties of carboxylic acids and acid derivatives.

Reference Books:

- Brian Smith: Infrared Spectral Interpretations: A Systematic Approach.
- Kotz, J.C., Treichel, P.M. & Townsend, J.R. *General Chemistry*, Cengage Learning India Pvt. Ltd.: New Delhi (2009).
- Mahan, B.H. *University Chemistry*, 3rd Ed. Narosa (1998).
- Petrucci, R.H. *General Chemistry*, 5th Ed., Macmillan Publishing Co.: New York (1985).
- Morrison, R. T. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. *Organic Chemistry* (*Volume 1*), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. *Organic Chemistry* (*Volume 2)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Pradeep's organic chemistry, Volume II & III.
- R Chand, organic chemistry, Volume II & III.
- Modern publications, organic chemistry, Volume III
- New Age International (P) Ltd, Publishers, Volume II.



B.Sc. II Year(3rdsem)

Practical – CHP 201

Max. Marks: 50 [10(int.)+40(ext.)]

Time: 4 Hrs.

Course objectives: The aim of the course is intended to provide the practical knowledge of

- Gravimetric analysis
- Inorganic preparations
- Enthalpy change and CST
- Analyzing organic compounds

SECTION – I (Inorganic)

1**. Gravimetric Analysis**

Quantitative estimations of, Cu^{2+}as copper thiocyanate and Ni^{2+} asNi – dimethylglyoxime.

2. **Preparations**: Preparation of Cuprous chloride, prussionbluefrom iron fillings, tetraammine cupric sulphate,

Section-B (Physical)

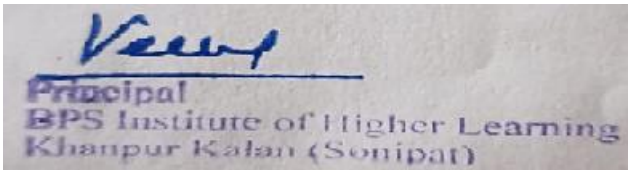
1. To determine the CST of phenol – water system.

2. To determine the solubility of benzoic acid at various temperatures and to

determine the ▲H of the dissolution process

Section-C (Organic)

(detection of extra elements, functional groups, determination of melting point or boiling point and preparation of at least one pure solid derivative) of the following simple mono and bi functional organic compounds: Naphthalene, Anthracene , acenaphthene , benzyl chloride, *p*-dichlorobenzene , *m*-dinitrobenzene , *p*nitrotoluene , resorcinol , hydroquinone, α-naphthol, β-naphthol , benzophenone, ethyl methyl ketone, benzaldehyde , vanillin.



Course outcome: The students will be able to

- study the gravimetric analysis of Cu^{2+} and Ni^{2+} and preparation of Prussian blue,Cu_2Cl_2 and copper teramine .
- determine the CST of phenol-water system and ΔH of dissolution.
- study the systematic identification of various organic compounds.

Reference Books :

1. A. D. Chawla , New College Practical Chemistry ,B.Sc. -II , Vijay Pub. 2011.

2. V. Alexeyev ,Quantative Analysis ,Mir Pub. Moscow.

3. S.C. Kheterpal,S.N. Dhawan ,P.N. Kapil : Advanced Practical Chemustry, Vol -II .

4.R.L. Madan ,Practical Chemistry ,B.Sc. Part-II.

5. ArunChhikara ,S.P. Bhutani : Qualitative Organic Chemistry .

Principal
BPS Institute of Higher Learning
Khanpur Kalan (Sonipat)

B. Sc. II Year (IVth Semester)

Paper - Inorganic Chemistry **Max. Marks: 27**

CHE-202A **Time: 3 Hrs.**

Note: Examiner will set nine questions and the candidates will be required to attempt five questions in all. Question number one will be compulsory covering the entire syllabus and will be of seven marks. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each section which will be of five marks each.

Course objectives: The aim of the course is intended to provide the knowledge of

- Lanthanides and actinoids
- Theory of qualitative and quantitative inorganic analysis.

Section-A

Chemistry of f – block elements

Lanthanides

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

Section-B

Chemistry of f – block elements

Actinides

General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from U, Comparison of properties of Lanthanides and Actinides and with transition elements.

Section-C

Theory of Qualitative and Quantitative Inorganic Analysis-I

Chemistry of analysis of various acidic radicals, Chemistry of identification of acid radicals in typical combinations, Chemistry of interference of acid radicals including their removal in the analysis of basic radicals.

Section-D

Theory of Qualitative and Quantitative Inorganic Analysis-II

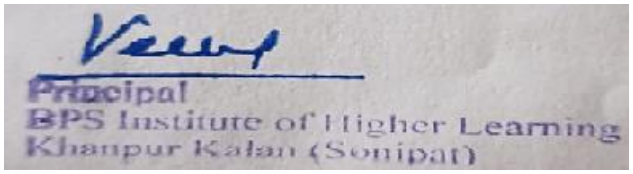
Chemistry of analysis of various groups of basic radicals, Theory of precipitation, co-precipitation, Post- precipitation, purification of precipitates.

Course outcome: The students will be able to

- Understand the occurrence, isolation and properties of lanthanoids.
- Understand the occurrence, isolation and properties of actinoids.
- Take idea of qualitative and quantitative analysis of acid and basic radicals including interfering and combinations.
- Explain theory of precipitation, co-precipitation and purifications.

Reference Books:

- Lee, J.D. *Concise Inorganic Chemistry* ELBS, 1991.
- Cotton, F.A., Wilkinson, G. &Gaus, P.L. *Basic Inorganic Chemistry*, 3rd ed., Wiley.
- Douglas, B.E., McDaniel, D.H. & Alexander, J.J. *Concepts and Models in Inorganic Chemistry*, John Wiley & Sons.
- Huheey, J.E., Keiter, E.A., Keiter, R.L. & Medhi, O.K. Inorganic Chemistry: Principles of Structure and Reactivity, Pearson Education India, 2006.
- Pradeep's inorganic chemistry, Volume III.



- R Chand, inorganic chemistry, Volume III.
- Modern publications,inorganic chemistry, Volume IV.
- Coordination chemistry by Ajai kumar, Aaryush publications, Delhi.

B. Sc. IInd Year (IVth Semester)

Paper - Physical Chemistry

CHE-202B

Max.Marks: 27
Time: 3 Hrs.

Note: Examiner will set nine questions and the candidates will be required to attempt five questions in all. Question number one will be compulsory covering the entire syllabus and will be of seven marks. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each section which will be of five marks each.

Course objectives: The aim of the course is intended to provide the knowledge of

- Thermodynamics
- Electrochemistry

Section-A

Thermodynamics-III

Second law of thermodynamics, need for the law, different statements of the law, Carnot's cycles and its efficiency, Carnot's theorem, Thermodynamics scale of temperature. Concept of entropy – entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change ,entropy as a criteria of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases.

Section-B

Thermodynamics-IV

Third law of thermodynamics: Nernst heat theorem, statement of concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz functions; Gibbs function

(G) and Helmholtz function (A) as thermodynamic quantities, A & G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of G and A with P, V and T.

Section-C

Electrochemistry-III

Electrolytic and Galvanic cells – reversible & Irreversible cells, conventional representation of electrochemical cells. EMF of cell and its measurement, Weston standard cell, activity and activity coefficients. Calculation of thermodynamic quantities of cell reaction (▲G, ▲H & K).

Types of reversible electrodes – metal- metal ion gas electrode, metal –insoluble salt- anion and redox electrodes. Electrode reactions, Nernst equations, derivation of cell EMF and single electrode potential. Standard Hydrogen electrode, reference electrodes, standard electrodes potential, sign conventions, electrochemical series and its applications.

Section-D

Electrochemistry-IV

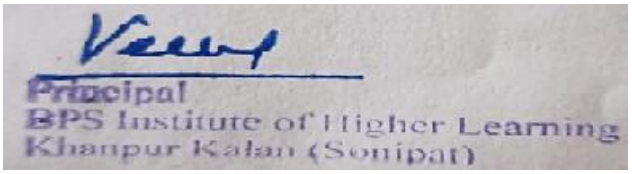
Concentration cells with and without transference, liquid junction potential, application of EMF measurement i.e. valency of ions, solubility product activity coefficient, potentiometric titration (acid- base and redox). Determination of pH using Hydrogen electrode, Quinhydrone electrode and glass electrode by potentiometric methods.

Course outcome: The students will be able to

- Know about the second law of thermodynamics,Carnot's cycle,criteria of spontaneity and entropy of mixing of ideal gaese.
- Study the Nernst heat theorem, absolute entropy,Gibbs-Helmholtz equation and variation of G and A with P,V and T.
- Take ideas of electrochemical cells,Nernst equation, cell EMF, reference cells, electrochemical cell and its applications.
- Study the concentration cells,liquid junction,EMF measurement and determination of pH by using various types of electrodes.

Reference Books:

- Barrow, G.M. *Physical Chemistry* Tata McGraw-Hill (2007).
- Castellan, G.W. *Physical Chemistry* 4th Ed. Narosa (2004).
- B. R. Puri, Madan S. Pathania, L. R. Sharma*Principles of Physical Chemistry* Vishal Publications.
- Chandra, A. K. *Introductory Quantum Chemistry* Tata McGraw-Hill (2001).
- House, J. E. *Fundamentals of Quantum Chemistry* 2nd Ed. Elsevier: USA(2004).
- Lowe, J. P. & Peterson, K. *Quantum Chemistry*, Academic Press (2005).
- Banwell, C. N. & McCash, E. M. *Fundamentals of Molecular Spectroscopy* 4th Ed. Tata McGraw-Hill: New Delhi (2006).
- Pradeep's physical chemistry, Volume III.
- R Chand, physical chemistry, Volume III.
- Modern publications, physical chemistry, Volume IV



B. Sc. IInd Year (IVth Semester)

Paper - Organic Chemistry

CHE-202C

Marks: 26
Time: 3 Hrs.

Note: Examiner will set nine questions and the candidates will be required to attempt five questions in all. Question number one will be compulsory covering the entire syllabus and will be of six marks. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each section which will be of five marks each.

Course objectives: The aim of the course is intended to provide the knowledge of

- IR spectroscopy
- Nitrogen containing compounds
- Carbonyl compounds.

Section-A

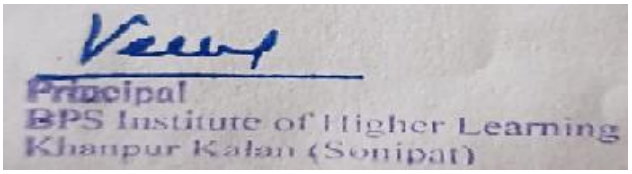
Infrared (IR) absorption spectroscopy

Molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds. Applications of IR spectroscopy in structure elucidation of simple organic compounds.

Section-B

Amines

Structure and nomenclature of amines, physical properties. Separation of a mixture of primary, secondary and tertiary amines. Structural features affecting basicity of amines. Preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles, reductive amination of aldehydic and ketonic compounds. Gabriel-



phthalimide reaction, Hofmann bromamide reaction. electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid

Section-C

1. Diazonium Salts

Mechanism of diazotisation, structure of benzene diazonium chloride, Replacement of diazo group by H, OH, F, Cl, Br, I, NO_2 and CN groups, reduction of diazonium salts to hyrazines, coupling reaction and its synthetic application.

2. Nitro Compounds

Preparation of nitro alkanes and nitro arenes and their chemical reactions. Mechanism of electrophilic substitution reactions in nitro arenes and their reductions in acidic, neutral and alkaline medium.

Section-D

Aldehydes and Ketones

Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, advantage of oxidation of alcohols with chromium trioxide (Sarett reagent) pyridinium chlorochromate (PCC) and pyridinium dichromate., Physical properties. Comparison of reactivities of aldehydes and ketones. Mechanism of nucleophilic additions to carbonyl group with particular

emphasis on benzoin, aldol, Perkin and Knoevenagel condensations. Condensation with ammonia and its derivatives. Wittig reaction. Mannich reaction.Oxidation of aldehydes, Baeyer–Villiger oxidation of ketones, Cannizzaro reaction. MPV, Clemmensen, Wolff-Kishner, $LiAlH_4$ and$NaBH_4$ reductions.

Course outcome: The students will be able to

- Study the principle, presentation and analysis of IR spectra, structure elucidation of simple organic compound using IR spectroscopy.
- Understand the preparations and properties of amines,diazonium salts and nitro compounds .
- Understand the preparations and properties of aldehydes and ketones.

Reference Books:

- Morrison, R. T. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- C.N. Banwell: Fundamentals of Molecular Spectroscopy.
- Finar, I. L. *Organic Chemistry* (*Volume 2)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Berg, J.M., Tymoczko, J.L. &Stryer, L. *Biochemistry*, W.H. Freeman, 2002.
- Nelson, D. L. & Cox, M. M. *Lehninger's Principles of Bioch*emistry *7th Ed.,* W. H. Freeman.
- Berg, J.M., Tymoczko, J.L. &Stryer, L. *Biochemistry*, W.H. Freeman, 2002.
- Pradeep's organic chemistry, Volume III.
- R Chand, organic chemistry, Volume III.
- Modern publications, organic chemistry, Volume IV.
- New Age International (P) Ltd, Publishers Volume, I and III.

BSc.2nd (4thsem)

Practicals-CHP 202

Max. Marks: 50 [10 (int.) + 40(ext.)]

Time: 4 Hrs.

Course objectives: The aim of the course is intended to provide the practical knowledge of

- Colorimetery
- Inorganic Synthesis
- Calorimetery
- Distribution law
- Identifying the organic compounds

SECTION – I (Inorganic)

1 **.Colorimetry:**

To verify Beer - Lambert law for $KMnO_4$/$K_2Cr_2O_7$and determine the concentration of the given $KMnO_4$ /$K_2Cr_2O_7$ solution.

2. Preparations: Preparation of chrome alum,

Potassium trioxalatochromate (III).

Section-B (Physical)

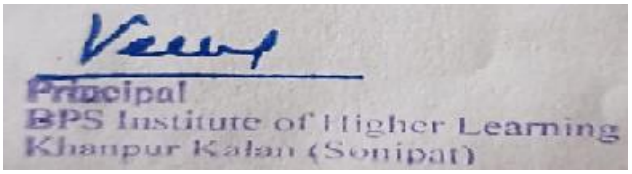
1. To determine the enthalpy of neutralisation of a weak Acid /weak base vs. strong base /strong acid and determine the enthalpy of ionisation of the weak acid /weak base.

2. To determine the enthalpy of solution of solid calcium chloride

3. To study the distribution of iodine between water and benzene .

Section-C (Organic)

Systematic identification (detection of extra elements, functional groups, determination of melting point or boiling point and preparation of at least one pure solid derivative) of the following



simple mono and bifunctional organic compounds: oxalic acid , succinic acid , benzoic acid , salicyclic acid aspirin, phthalic acid, cinnamic acid, benzamide , urea, acetanilide, benzanilide, aniline hydrochloride, p-toluidine, phenyl salicylate (salol), glucose, fructose, sucrose, *o* , *m, p*-nitroanilines , thiourea.

Course outcome: The students will be able to

- verify Beer-Lambert law for $KMnO_4$ /$K_2Cr_2O_7$.
- study the preparation of chrome alum and potassium trioxalatochromate(III)
- study the systematic identification of various organic compounds

Books Suggested:-

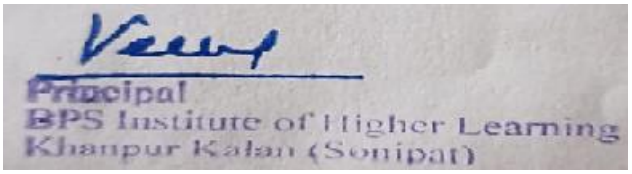
1. A. D. Chawla , New College Practical Chemistry ,B.Sc. II , Vijay Pub. 2011.

2. V. Alexeyev ,Quantative Analysis ,Mir Pub. Moscow.

3. S.C. Kheterpal,S.N. Dhawan ,P.N. Kapil : Advanced Practical Chemistry, Vol -II ,2011.

4.R.L. Madan ,Practical Chemistry ,B.Sc. Part-II.

5. ArunChhikara ,S.P. Bhutani : Qualitative Organic Chemistry .



B. Sc. III Year (Vth Semester)

Paper - Inorganic Chemistry **Max. Marks: 27**

CHE-301A **Time: 3Hrs.**

Note: Examiner will set nine questions and the candidates will be required to attempt five questions in all. Question number one will be compulsory covering the entire syllabus and will be of seven marks. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each section which will be of five marks each.

Course objectives: The aim of the course is intended to provide the knowledge of

- Transition metal complexes- bonding, magnetic properties and stability
- Electronic spectra of Transition metal complexes.

SECTION–A

Metal-ligand Bonding in Transition Metal Complexes

Limitations of valence bond theory, an elementary idea of crystal-field theory, crystal field splitting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal-field parameters.

SECTION–B

Thermodynamic and Kinetic Aspects of Metal Complexe

A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, substitution reactions of square planar complexes of Pt(II).

SECTION-C

Magnetic Properties of Transition Metal Complexe

Type of magnetic behavior , methods of determining magnetic susceptibility ,

Spin only formula , LS coupling ,correlation of μ_s and μ_{eff} values , orbital

contribution to magnetic moments , application of magnetic moment data for 3d

metal complexes

SECTION-D

Electron Spectra of Transition Metal Complexes

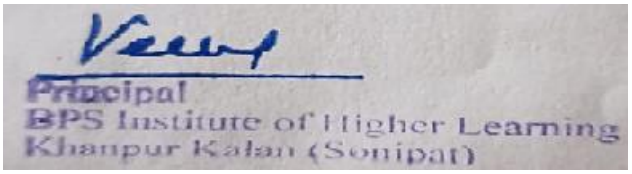
Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectrochemical series. Orgel-energy discussion of the electronic spectrum of $[Ti(H_2O)]^{3+}$ complex ion.

Course outcome: The students will be able to

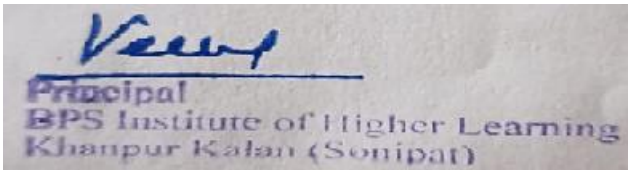
- study VBT, CFT of octahedral, tetrahedral and square planar complexes, limitation of VBT and factors affecting CFT.
- understand the thermodynamic and kinetic aspects of transition metal complexes,trans effect, theories of trans effect, mechanism of substitution of square planar complexes.
- determine the magnetic moment, magnetic susceptibility,LS coupling of transition metal complexes.
- calculate microstates,ground state terms.idea of selection rule, Orgel-energy diagrams

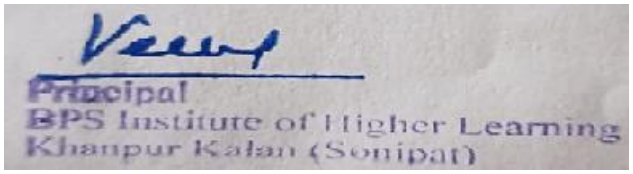
Reference Books:

- Lee, J.D. *Concise Inorganic Chemistry* ELBS, 1991.
- Cotton, F.A., Wilkinson, G. &Gaus, P.L. *Basic Inorganic Chemistry*, 3rd ed., Wiley.
- Douglas, B.E., McDaniel, D.H. & Alexander, J.J. *Concepts and Models in Inorganic Chemistry*, John Wiley & Sons.



- Huheey, J.E., Keiter, E.A., Keiter, R.L. & Medhi, O.K. Inorganic Chemistry: Principles of Structure and Reactivity, Pearson Education India, 2006.
- Pradeep's inorganic chemistry, Volume III.
- R Chand, inorganic chemistry, Volume III.
- Modern publications,inorganic chemistry, Volume V.
- Coordination chemistry by Ajai kumar, Aaryush publications, Delhi.

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Khanpur Kalan (Sonipat)

B. Sc. IIInd Year (Vth Semester)

Paper -Physical Chemistry

CHE-301B

Max.Marks: 27
Time: 3 Hrs.

Note: Examiner will set nine questions and the candidates will be required to attempt five questions in all. Question number one will be compulsory covering the entire syllabus and will be of seven marks. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each section which will be of five marks each.

Course objectives: The aim of the course is intended to provide the knowledge of

- Quantum mechanics
- Rotational, vibration and Raman spectroscopy

Section-A

Quantum Mechanics-I

Black-body radiation, Plank's radiation law, photoelectric effect, heat capacity of solids, Compton effect,wave function and its significance of Postulates of quantum mechanics , quantum mechanical operator, commutation relations, Hamiltonial operator, Hermitian operator, average value of square of Hermitian as a positive quantity, Role of operators in quantum mechanics, To show quantum mechanically that position and momentum cannot be predicated simultaneously, Determination of wave function & energy of a particle in one dimensional box, Pictorial representation and its significance,

Section-B

Physical Properties and Molecular Structure

Optical activity, polarization – (clausius – Mossotti equation).

Orientation of dipoles in an electric field, dipole moment, included dipole moment, measurement of dipole moment-temperature method and refractivity method, dipole moment and structure of molecules, Magnetic permeability, magnetic susceptibility and its determination. Application of magnetic susceptibility, magnetic properties – paramagnetism, diamagnetism and ferromagnetics

.

Section-C

Spectroscopy-I

Introduction: Electromagnetic radiation, regions of spectrum, basic features of spectroscopy, statement of Born-oppenheimer approximation, Degrees of freedom.

Rotational Spectrum

Diatomic molecules. Energy levels of rigid rotator (semi-classical principles), selection rules, spectral intensity distribution using population distribution (Maxwell-Boltzmann distribution), determination of bond length, qualitative description of non-rigid rotor, isotope effect.

Section-D

Spectroscopy-II

Vibrational spectrum

Infrared spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effects of anharmonic motion and isotopic effect on the spectra., idea of vibrational frequencies of different functional groups.

Raman Spectrum:
Concept of polarizibility, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules, Quantum theory of Raman spectra.

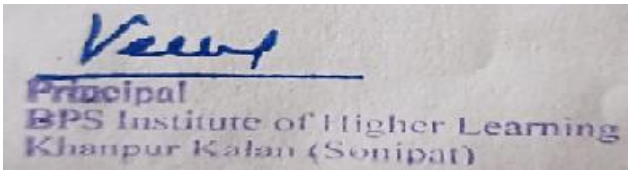
Course outcome: The students will be able to

- Know about black body radiation,Plank's radiation law,photoelectric effect,heat capacity of solids,Compton effect,quantum mechanics postulates,operator, particle in one dimensional box.
- Study the Clausius-Mossotti equation,dipole moment measurement, magnetic permeability, magnetic susceptibility and its determination.
- Take idea of electromagnetic radiation, principle and basic features of rotational spectroscopy,non rigid rotator and isotopic effect.
- Study the principle and applications of vibrational and raman spectroscopy.

Reference Books:

- Barrow, G.M. *Physical Chemistry* Tata McGraw-Hill (2007).
- Castellan, G.W. *Physical Chemistry* 4th Ed. Narosa (2004).
- B. R. Puri, Madan S. Pathania, L. R. Sharma*Principles of Physical Chemistry* Vishal Publications.
- Chandra, A. K. *Introductory Quantum Chemistry* Tata McGraw-Hill (2001).
- House, J. E. *Fundamentals of Quantum Chemistry* 2nd Ed. Elsevier: USA(2004).
- Lowe, J. P. & Peterson, K. *Quantum Chemistry*, Academic Press (2005).
- Banwell, C. N. & McCash, E. M. *Fundamentals of Molecular Spectroscopy* 4th Ed. Tata McGraw-Hill: New Delhi (2006).
- Pradeep's physical chemistry, Volume III.
- R Chand, physical chemistry, Volume III.

Modern publications, physical chemistry, Volume V.



B. Sc. IIIrd Year (Vth Semester)

Paper - Organic Chemistry

CHE-301C

Max.Marks: 26
Time: 3 Hrs.

Note: Examiner will set nine questions and the candidates will be required to attempt five questions in all. Question number one will be compulsory covering the entire syllabus and will be of six marks. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each section which will be of five marks each.

. **Course objectives:** The aim of the course is intended to provide the knowledge of

- NMR spectroscopy
- Carbohydrates
- Organometallic compounds.

Section-A

NMR Spectroscopy-I

Principle of nuclear magnetic resonance, the PMR spectrum, number of signals, peak areas, equivalent and non equivalent protons positions of signals and chemical shift, shielding and deshielding of protons, proton counting, splitting of signals and coupling constants, magnetic equivalence of protons..

Section-B

NMR Spectroscopy-II

Discussion of PMR spectra of the molecules: ethyl bromide, n–propyl bromide, isopropyl bromide, 1,1-dibromoethane, 1,1,2-tribromoethane, ethanol, acetaldehyde, ethyl acetate, toluene,

benzaldehyde and acetophenone.. Simple problems on PMR spectroscopy for structure determination of organic compounds.

SECTION – C

Carbohydrates-I

Classification and nomenclature. Monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses. Configuration of monosaccharides. Erythro and threo diastereomers. Conversion of glucose into mannose. Formation of glycosides, ethers and esters. Determination of ring size of glucose and fructose. Open chain and cyclic structure of D(+)-glucose & D(-) fructose. Mechanism of mutarotation. Structures of ribose and deoxyribose.

SECTION – D

1. Carbohydrates-II

An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination.

2. Organometallic Compounds

Organomagnesium compounds: the Grignard reagents-formation, structure and chemical reactions. Organozinc compounds: formation and chemical reactions. Organolithium compounds: formation and

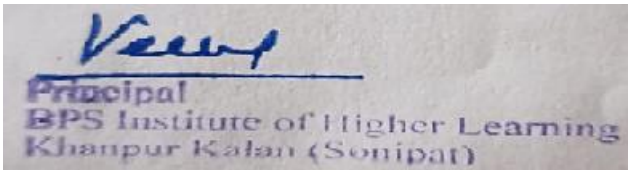
chemical reactions.

Course outcome: The students will be able to

- Study the principle, presentation and analysis of NMR spectra, structure elucidation of simple organic compound using NMR spectroscopy.
- Understand the classification, nomenclature, structure, physical and chemical properties of monosaccharides, oligosaccharides and polysaccharides.
- Understand the structure, preparations and properties of organometallic compounds i.e Grignard's reagent, organozinc and organolithium.

Reference Books:

- Morrison, R. T. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- C.N. Banwell: Fundamentals of Molecular Spectroscopy.
- Finar, I. L. *Organic Chemistry* (*Volume 2)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Berg, J.M., Tymoczko, J.L. &Stryer, L. *Biochemistry*, W.H. Freeman, 2002.
- Nelson, D. L. & Cox, M. M. *Lehninger's Principles of Bioch*emistry *7th Ed.*, W. H. Freeman.
- Berg, J.M., Tymoczko, J.L. &Stryer, L. *Biochemistry*, W.H. Freeman, 2002.
- Pradeep's organic chemistry, Volume III.
- R Chand, organic chemistry, Volume III.
- Modern publications, organic chemistry, Volume V.
- New Age International (P) Ltd, Publishers Volume, I and III.



B.Sc. III Year(Vth Semester)

Practical –CHP 301

Max. Marks: 50 [10(int.)+40(ext.)]

Time: 4 Hrs.

Course objectives: The aim of the course is intended to provide the practical knowledge of

- Radical analysis
- Coductometric titrations
- Separation and purifications of organic compounds.
- Organic preparations.

SECTION – I (Inorganic)

Semimicro qualitative analysis of mixture containing not more than four radicals (excluding interfering radicals $C_2O_4^{2-}$,PO_4^{3-}, BO_3^{3-}):

Basic Radicals : Pb^{2+}, Hg_2^{2+},Hg^{2+}, Ag^{+}, Bi^{3+},Cu^{2+} ,Cd^{2+}, As^{3+},Sb^{3+}, Sn^{2+}, Fe^{3+}, Cr^{3+},Al^{3+}, Co^{2+}, Ni^{2+}, Mn^{2+}, Zn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, Mg^{2+},NH_4^{+}

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

Section-B (Physical)

1. To determine the strength of the given acid solution (mono and dibasic

acid) conductometrically.

2. To determine the solubility and solubility product of a sparingly soluble

electrolyte conductometrically.

Section-C (Organic)

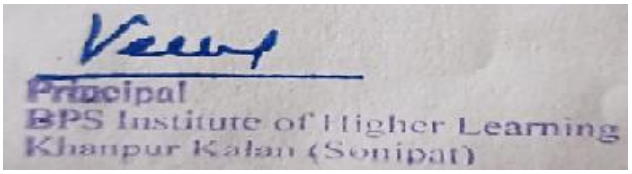
1. Laboratory Techniques (a) Steam distillation (non evaluative) naphthalene from its suspension in water,

Separation of *o*-and *p* -nitrophenols

(b) Column chromatography (non evaluative)

Separation of fluorescein and methylene blue .Separation of leaf pigments from spinach leaves

2. Synthesis of the following organic compounds:



(a) To prepare o- chlorobenzoic acid from anthranilic acid.

Course outcome: The students will be able to

- Determine normality, strength and of mono and dibasic acid and solubility product of sparingly soluble salt, coductometrically .
- Study the preparation of o-Chlorobenzoic acid and to separate a mixture by using steam distillation and column chromatography technique.
- Study the systematic identification of acid and basic radicals of a mixture without interfering radicals and combinations.

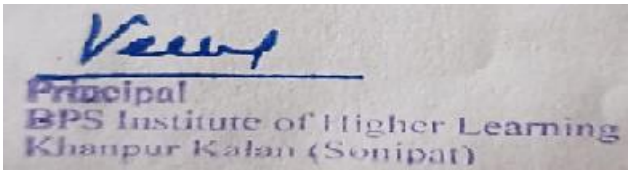
Books Suggested:-

1. A. D. Chawla , New College Practical Chemistry ,B.Sc. -III , Vijay Pub. 2011.

2. S.C. Kheterpal, S.N. Dhawan ,P.N. Kapil : Advanced Practical Chemustry, Vol -III , 2011.

3..R.L. Madan ,Practical Chemistry ,B.Sc. Part-III.

4. A.L. Vogal ,A text book of Micro and Semi-micro quantativeanalysis, Orient Longman Pub.



B. Sc. III Year (VI th Semester)

Paper - Inorganic Chemistry **Max. Marks: 27**

CHE-302A **Time: 3 Hrs.**

Note: Examiner will set nine questions and the candidates will be required to attempt five questions in all. Question number one will be compulsory covering the entire syllabus and will be of seven marks. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each section which will be of five marks each.

Course objectives: The aim of the course is intended to provide the knowledge of

- Organometallic chemistry
- Acids bases concept
- Bioinorganic chemistry
- Inorganic polymers

Section-A

Organometallic Chemistry

Definition, nomenclature and classification of organometallic compounds. Preparation, properties, and bonding of alkyls of Li, Al, Hg, and Sn a brief account of metal- ethylenic complexes, mononuclear carbonyls and the nature of bonding in metal carbonyls.

Section-B

Acids and Bases, HSAB Concept

Arrhenius, Bronsted – Lowry, the Lux – Flood, Solvent system and Lewis concepts of acids & bases, relative strength of acids & bases, Concept of Hard and Soft Acids & Bases. Symbiosis, electronegativity and hardness and softness

Section—C

Bioinorganic Chemistry

Essential and trace elements in biological processes, metalloporphyrins with special reference to haemoglobin and

myoglobin. Biological role of alkali and alkaline earth metal ions with special reference to Ca^{2+}. Nitrogen fixation.

Section—D

Silicones and Phosphazenes

Silicones and phosphazenes, their preparation, properties,structure and uses.

Course outcome: The students will be able to

- Study nomenclature, classification and properties of organometallic compounds, Homogeneous catalysis, Wilkinson's catalyst, metal carbonyls and stretching frequency of CO in metal carbonyls.
- Understand the Arrhenius,Bronsted,Lux-Flood and solvent system concept of acid and bases, HSAB principle and its applications and limitations.
- Study the essential and trace elements,metalloporphyrins, hemoglobin and myoglobin,nitrogen fixation.
- Understand the structure, preparations and properties of inorganic polymers i.e silicones and phosphazenes.

Reference books

- B. R. Puri, Madan S. Pathania , L. R. Sharma*Principles of Physical Chemistry* Vishal Publications.
- Douglas, B.E., McDaniel, D.H. & Alexander, J.J. *Concepts and Models in Inorganic Chemistry*, John Wiley & Sons.
- Huheey, J.E., Keiter, E.A., Keiter, R.L. & Medhi, O.K. Inorganic Chemistry: Principles of Structure and Reactivity, Pearson Education India, 2006.
- Pradeep's inorganic chemistry, Volume III.
- R Chand, inorganic chemistry, Volume III.
- Modern publications,inorganic chemistry, Volume VI.
- Coordination chemistry by Ajai kumar, Aaryush publications, Delhi.

B. Sc. IIIrd Year (VIth Semester)

Paper - Physical Chemistry

CHE-302B

Max.Marks: 27
Time: 3 Hrs.

Note: Examiner will set nine questions and the candidates will be required to attempt five questions in all. Question number one will be compulsory covering the entire syllabus and will be of seven marks. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each section which will be of five marks each.

Course objectives: The aim of the course is intended to provide the knowledge of

- Electronic spectroscopy
- Photochemistry
- Phase diagram
- Colligative properties.

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Section-A

Spectroscopy-III

Electronic Spectrum

Concept of potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules and Franck- Condon principle.

Qualitative description of sigma and pie and n molecular orbital (MO) their energy level and respective transitions.

Section-B

Photochemistry

Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grotthus -Drapper law, Stark-Einstein law (law of photochemical equivalence) Jablonski diagram depiciting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions-energy transfer processes (simple examples)

Section-C

Solutions:

Dilute Solutions and Colligative Properties

Ideal and non-ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient. Dilute solution, Colligative properties, Raolut's law, relative lowering of vapour pressure, molelcular weight determination, Osmosis law of osmotic pressure and its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression of freezing point, Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods for determining various colligative properties. Abnormal molar mass, degree of dissociation and association of solutes.

Section-D

Phase Equillibrium

Statement and meaning of the terms – phase component and degree of freedom, thermodynamic derivation of Gibbs phase rule, phase equilibria of one component system –Example – water and Sulpher systems.

Phase equilibria of two component systems solid-liquid equilibria, simple eutectic

Example Pb-Ag system, desilverisation of lead.

Course outcome: The students will be able to

- Know about potential energy curve, Franck-Condon principle, selection rules in electronic spectroscopy, term symbols.
- Study the lambert-Beer's law, laws of photochemistry, quantum yield, Jablonski diagram, fluorescence and phosphorescence.

- Take idea colligative properties, Raoult's laws,ideal and non ideal solutions,abnormal molecular mass and degree of association and dissociation.

- Understand Gibbs phase rule, phase diagrams one and two component system,degree of freedom.

Reference Books:

- K. K. Rohatgi, Mukherjee,*Fundamentals of Photochemistry*, New Age International
- Banwell, C. N. & McCash, E. M. *Fundamentals of Molecular Spectroscopy* 4th Ed. Tata McGraw-Hill: New Delhi (2006).
- Pradeep's physical chemistry, Volume III.
- R Chand, physical chemistry, Volume III.
- Modern publications, physical chemistry, Volume VI.

B. Sc. IIIrd Year (VIth Semester)

Paper -Organic Chemistry

CHE-302C

Max.Marks: 26
Time: 3 Hrs.

Note: Examiner will set nine questions and the candidates will be required to attempt five questions in all. Question number one will be compulsory covering the entire syllabus and will be of six marks. Further, examiner will set two questions from each section and the candidates will be required to attempt one question from each section which will be of five marks each.

Course objectives: The aim of the course is intended to provide the knowledge of

- Heterocyclic and organosulphur compounds
- Synthesis of organic compounds via enolates
- Synthetic polymers, amino acids and proteins

SECTION – A

Heterocyclic Compounds-I

Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole

SECTION – B

1. Heterocyclic Compounds-II

Introduction to condensed five and six- membered heterocycles. Prepration and

reactions of indole, quinoline and isoquinoline with special reference to Fisher indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis. Mechanism of electrophilic substitution reactions of, quinoline and isoquinoline

2.Organosulphur Compounds

Nomenclature, structural features, Methods of formation and chemical reactions of thiols, thioethers, sulphonic acids, sulphonamides and sulphaguanidine. Synthetic detergents alkyl and aryl sulphonates.

SECTION – C

1. Organic Synthesis *via* Enolates

Acidity of α-hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate: the Claisen condensation. Keto - enol tautomerism of ethyl acetoacetate.

2. **Synthetic Polymers**

Addition or chain-growth polymerization. Free radical vinyl polymerization, ionic vinyl polymerization, Ziegler-Natta polymerization and vinyl polymers. Condensation or step growth polymerization. Polyesters, polyamides, phenol formaldehyde resins, urea formaldehyde resins, epoxy resins and polyurethanes.Natural and synthetic rubbers.

Section – D

Amino Acids, Peptides& Proteins

Classification, of amino acids. Acid-base behavior, isoelectric point and electrophoresis. Preparation of α-amino acids. Structure

and nomenclature of peptides and proteins. Classification of proteins. Peptide structure determination, end group analysis, selective hydrolysis of peptides. Classical peptide synthesis, solid–phase peptide synthesis. Structures of peptides and proteins Primary & Secondary structure.

Course outcome: The students will be able to

- Understand the structure, preparations and properties of heterocyclic compound.
- Study the structure, preparations and properties of organosulphur,enolates.
- Understand the structure, preparations, properties and uses of synthetic polymers
- Understand the structure, preparations and properties of amino acids, proteins.

Reference Books:

- Morrison, R. T. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- C.N. Banwell: Fundamentals of Molecular Spectroscopy.
- Finar, I. L. *Organic Chemistry* (*Volume 2)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Berg, J.M., Tymoczko, J.L. &Stryer, L. *Biochemistry*, W.H. Freeman, 2002.
- Nelson, D. L. & Cox, M. M. *Lehninger's Principles of Bioch*emistry *7th Ed.*, W. H. Freeman.
- Berg, J.M., Tymoczko, J.L. &Stryer, L. *Biochemistry*, W.H. Freeman, 2002.
- Pradeep's organic chemistry, Volume III.
- R Chand, organic chemistry, Volume III.
- Modern publications, organic chemistry, Volume VI.
- New Age International (P) Ltd, Publishers Volume, I and III
- Finar, I. L. *Organic Chemistry* (*Volume 2)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

B.Sc. III Year(6^{th}sem)

Practical-CHP 302

Max. Marks: 50[10(int.)+40(ext.)]

Time: 4 Hrs.

Course objectives: The aim of the course is intended to provide the practical knowledge of

- Radical analysis
- Use of pH meter and potentiometer
- Thin layer chromatography
- Organic synthesis

SECTION – I (Inorganic)

Semimicro qualitative analysis of mixture containing not more than four radicals (including interfering, Combinations and excluding insolubles):

Basic Radicals : Pb^{2+}, Hg_2^{2+},Hg^{2+}, Ag^{+}, Bi^{3+},Cu^{2+} ,Cd^{2+}, As^{3+},Sb^{3+}, Sn^{2+}, Fe^{3+}, Cr^{3+},Al^{3+}, Co^{2+}, Ni^{2+}, Mn^{2+}, Zn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, Mg^{2+},NH_4^{+}

Acid Radicals: CO_3^{2-}, S^{2-},SO_3^{2-}, $S_2O_3^{2-}$, NO_2^{-}, CH_3COO^{-}, Cl^{-}, Br^{-}, I^{-}, $C_2O_4^{2-}$, NO_3^{-} ,SO_4^{2-}, PO_4^{3-}, BO_3^{3-} .

Section-B (Physical)

1. To determine the strength of given acid solution (mono and dibasicacid) potentiometrically.

2. To determine the molecular weight of a non-volatile solute by Rast method.

3. To standardize the given acid solution (mono and dibasic acid) Ph metrically.

Section-C (Organic)

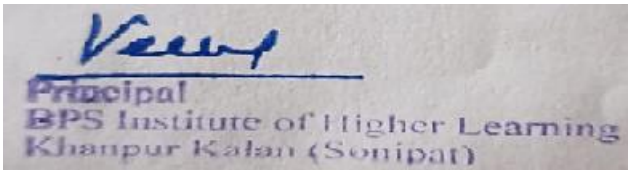
1. Thin Layer Chromatography

Determination of R_f values and identification of organic compunds

(a) Separation of green leaf pigments (spinach leaves may be used)

(b) Separation of a mixture of coloured organic compounds using common organic solvents.

2. Synthesis of the following organic compounds:



(a) To prepare p-bromoaniline from p-bromoacetanilide.

(b) To prepare m-nitroaniline from m-dinitrobenzene.

Distribution of marks

Distribution of marks

External - Total

1. Section I 08 marks

2. Section II 08 marks

3. Section III 08 marks

4. Viva-voce 06 marks

Internal -

Copy+Attendence(8+2)= 10Marks

Course outcome: The students will be able to

- Determine normality, strength and of mono and dibasic acid and solubility product of sparingly soluble salt, coductometrically .
- Study the preparation of p-Bromoaniline and m-nitroaniline and to determine the R_f value and identification of organic compounds using TLC technique.
- Study the systematic identification of acid and basic radicals of a mixture with interfering acid radicals and combinations.

Books suggested:-1. A. D. Chawla , New College Practical Chemistry ,B.Sc. -III , Vijay Pub. 2011.

2. S.C. Kheterpal,S.N. Dhawan ,P.N. Kapil : Advanced Practical Chemistry, Vol -III ,2011.

3.R.L. Madan ,Practical Chemistry ,B.Sc. Part-III.

4.A.L. Vogal ,A text book of Micro and Semi-micro quantative analysis,Orient Longman Pub

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Khanpur Kalan (Sonipat)

B.P.S. Mahila Vishwavidyalaya, Khanpur Kalan, Sonipat-131305

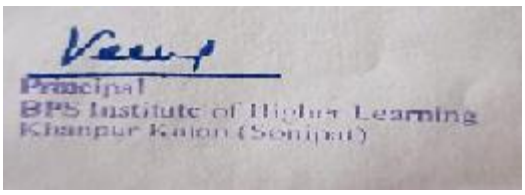
DEPARTMENT OF MEDICAL SCIENCE

COURSE CURRICULUM & SCHEME OF EXAMINATIONS

w.e.f. July, 2022

ZOOLOGY

Programme Code-054



Programme Outcomes of B.Sc.medical

B. Medical Students will become able to define and explain major concepts in the biological sciences.
C. Students will be able to correctly use biological and chemical instrumentation and proper laboratory techniques.
D. They will efficient to communicate biological and chemical knowledge in oral and written form.
E. Students will be capable to recognize the relationship between structure and function at all levels: B.Sc. Medical students acquire knowledge in the subjects of Botany, Zoology, genetics and cellular.
F. They can opt for higher studies in Botany, Zoology, Chemistry and Biochemistry and can have research carrer option.
G. Students gain knowledge and skill in the fundamentals of animal sciences and plants, the complex interactions among various living organisms, understands their basic and apply them to their life careers.
H. They understand the complex evolutionary processes and behaviour of animals and plants.
I. Students get critically evaluation of ideas and arguments by collection relevant information about the plants and animals, so as recognize the position of plant in the broad classification and phylogenetic level.
J. Career options after completing B.Sc with medical science:

Teaching

Evolutionarist

Taxonomist

Forensic laboratory

Agriculture

Sericulture

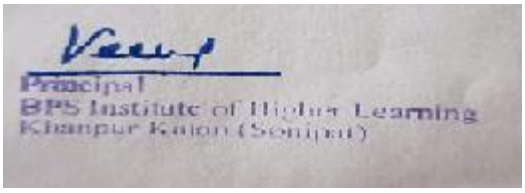
Aquaculture

Butterfly farming

Apiculture

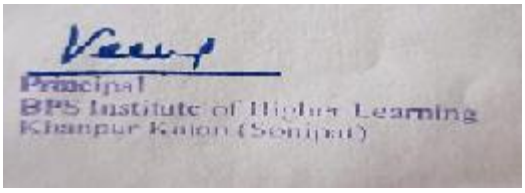
Vermicomposting

Research



Course Outcomes of B.Sc. Zoology

B. Students analyse complex interactions among the various animals of different phyla, their distribution and their relationship with the environment.
C. They can apply the knowledge of internal structure of cell, its functions in control of various metabolic functions of organisms.
D. Gain understanding of environmental conservation processes and its importance, pollution control and biodiversity and protection of endangered species
E. Students get knowledge of Agro based Small Scale industries like sericulture, fish farming, butterfly farming and vermicompost preparation.
F. Understands about various concepts of genetics and its importance in human health.
G. They can apply ethical principles and commit to professional ethics and responsibilities in delivering his duties.
H. Students may apply the knowledge and understanding of Zoology to one's own life and work.
I. They develops empathy and love towards the animals.
J. They understand the nature and basic concepts of cell biology, genetics, taxonomy, physiology, ecology and applied Zoology.
K. Students apply ethical principles and commit to environmental ethics and responsibilities and norms of the biodiversity
L. Students gain knowledge about research methodologies, effective communication skills and proper laboratory techniques.
M. They can define and explain the basic principles of biochemistry and bioenergetics useful for biological studies for illustrating different their structure, function and metabolism.
N. Students develop a holistic approach that is necessary for sustainable development.
O. This course provide thorough understanding in the fundamental principles of systematic in which the animals are how to classify according to their characters and what are theories which have to follow for classification is studied.



Syllabus FOR B.Sc. : Ist -Medical

w.e.f. July 2022

ZOOLOGY

FIRST SEMESTER

Paper 1- Animal diversity (Protozoa to Annelida) Paper code- ZOO- 101A

External marks; 40 Total credits ; 03

Internal marks ; 10 Total marks ; 50

Course objectives: Students will be able to understand classifiy, identify, diversity of lower animals.

Unit- 1

- General Characters and Classifications up to Orders with examples economic importance of Protozoaa Type study Plasmodium Vivax Systematic position, Natural history, Life history, Schizogony, Gamogony, Sporogony Alternation of generation, Alternation of Hosts Adaptations,

Unit-2

Parazoa - General characters and classification up to orders with examples.

Type study - Sycon

Systematic position, Natural history, Morphology, Histology, Physiology of digestion, respiration, excretion, reproduction, Regeneraton, adaptation

Coelenterata - General characters and classification upto orders with examples.

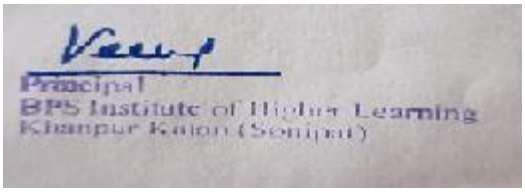
Type study -- Obelia.

Systematic position, Natural history, Morphology of colony, Histology, Physiology of colony, Medusa- Morphology, Histology, Nervous system, Origin, Physiology, Life history, Polymorphism, Alternation of generation, Adaptation.

Unit-3

Platyhelminthes - General characters and classification up to orders with examples.

Type study - Fasciola hepetica



Systematic position, Natural history, External Characters, Digestive system, Respiration, Nervous system, Excretory system, Reproductive system, Life history, Effect on the host, Control measures and Adaptations

Aschelminthes - General characters and classification upto orders with examples.

Type study - Ascaris

Systematic position, Natural history, External characters, Body wall, Locomotion, Digestive system, Respiration, Nervous system, Reproductive system, Life history, Effects on the Host, Control measures and adaptations.

Unit -4

Annelida

- General characters and classification up to orders with examples.

Type study - Leech

Systematic position, Natural history, External characters, Locomotion, Digestive system, Coelom, Haemocoelomic system, Respiratory system, Excretory system, Nervous system, Reproductive system, Adaptations.

Course Outcomes :

1.Knowing this he or she may engage themselves as a protector preserver and Promoter of life.

2. Students will be well equipped to become very competent in research or teaching fields.

Note for examiner -

1.The candidate shall attempt five questions in all, including the compulsory question. The examiner will set nine questions, including one objective type questions covering the entire syllabus, remaining Eight questions, Two from each unit.

2. All questions carry equal marks.

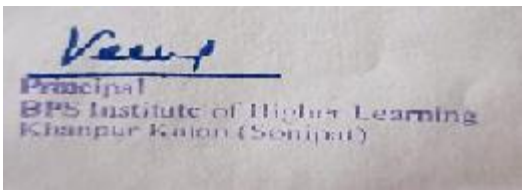
3. Max. marks ; 40

4.Time; 3 hours.

A Text book of Zoolog y : Nonchordates

Suggested Books

1.,L Dhami, P.S. & Dhami, J.K. , Invertebrates, R. Chand & Co., New



Delhi, 2001

2.Barnes, R.D. Invertebrates Zoology, W.B. Saunders, Philadelphia,

1999

3 Rotpal, R.L., Inveulebrates, Rastogi Pab. Mee rut

Syllabus FOR B.Sc. : Ist -Medical

w.e.f. July 2022

ZOOLOGY

FIRST SEMESTER

Paper -2 (Biochemistry and Cell biology) Paper code- 101B

External marks; 40 Total credits ; 03

Internal marks ; 10 Total marks ; 50

Course objectives: Students will get knowledge about prokaryotic and Eukaryotic cell structure and functions of cell organelles

UNIT 1

Bio Chemistry: Introduction, Classification, Structure and Functions of various

Biomolecules

Proteins

Carbohydrates

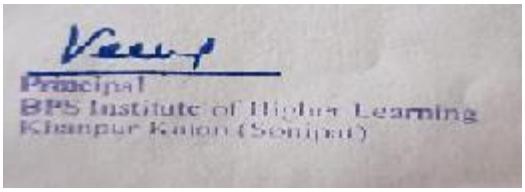
Lipids

Enzymes;- Nomenclature, classification and mechanism of action.

UNIT 2

Vitamins ;- Name, Source and Functions

Hormones;- Chemical nature and functions mechanism of action of hormone.



UNIT 3

CELL BIOLOGY

Cell biology: golgi body, centrosome, structure of cilia and flagella

Immunology : Overiview of immune system, cells of immune system

Innate and acquired immunity, Generation of immunogenicity, -- Ag- Ab interactions, Recognition of antigens B-cell epitopes,

UNIT 4

Cancer Biology: Types of cancer ,an elementary idea of cell transformation in

Cancer.Types of Tamours,Therapy of cancer

Structure and types of Chromosomes.

Course Outcomes:

1. By understanding the working of cells in healthy and diseased state students will be helped in for the research areas for higher studies.

2. Biochemistry has a student in further research areas in identifying certain diseases and their cause developing vaccines and pharmaceuticals etc

Note for examiner

1.The candidate shall attempt five questions in all, including the compulsory question. The examiner will set nine questions, including one objective type questions covering the entire syllabus, remaining Eight questions, Two from each unit.

2. All questions carry equal marks.

3. Max. marks ; 40

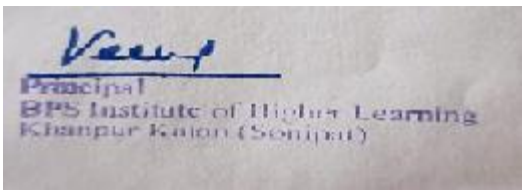
4.Time, 3 hours.

Suggested Books;-

Dhami, P.S. and Dhami, J.K., Economic Zoology, Pradeep Pub.

Jalandher, India.

Shukla GS and Upadhayay, Economic Zoology



Syllabus FOR B.Sc. : Ist -Medical

w.e.f. July 2022

ZOOLOGY

FIRST SEMESTER

(practical based on Theory)

Paper code -ZOP- 101

Time:-4 hours

Total Marks = 50 (External=40 + Internal=10)

1. Classification upto orders with ecological notes and economic importance of the following animals.

A. Protoza

(a) Examination of cultures of Euglena and Paramecium.

(b) SIlides: Amoeba, Euglena, Trypanosomna. Noctiluca,

Eimeria, Monocystis , Paramecium (Binary fission and

Conjugation), Opalina, Vorticella, Balantidium, Nictothrus, Radularian and foraminiferan ooze.

B.Parazoa

Specimens: Sycon, Grantia, Euplectella. Hyalonema, onomimean

Spongilla, and Euspongia.

C.Cnidaria

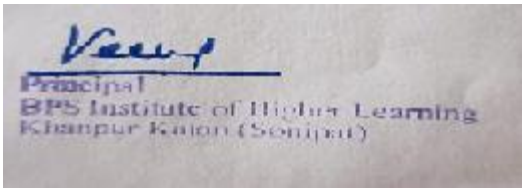
:Specimens: Porpita, Velella. Physalia. Aurelia Rhizostoma, Metridium, Millipora and Alcyonium, Tubipora, Zoanthus, Madrepora, Favia Fungia and Astraea

Slides: Hydra (W.M.), Hydra with buds,

Obelia (colony and medusa),

Sertularia, Pumularia, Bougainvillea and Aurelia

D.Plathyhelminthes



(a) Specimens : Dugesia, Fasciola, Taenia and Echininococcus.

(b) Slides: Miracidium,Sporocyst, Redia, Ceraria of Fasciola, Scolex and Proglojids of Taenia (mature and gravid)

E.Aschelminthes

Ascaris (male and female), Trichinella and Ancylostoma.

F.Annelida

Pheretima, Nereis, Heteronereis, Polynoe,

Aphrodite, Chaetopterus, Arenicola, Tubifix and Potobdella.

2.Dissections of Leech : Only Demonstration.

Digestive, reproductive andrervous systems

3.Study of permanent slides ;

Stúdy of T.S. through phasax, gizzard, sepnal1zesieles, prostetegads and typhlosolar

interstine of earthworm; Thrsngpboe and crop of leech.

L.S.and T.S. Sycon. Gemmules, spicules and sponging fibres of a sponge.

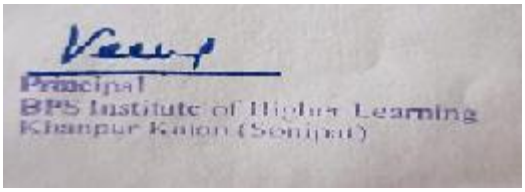
T.S. Hydra (Testis and ovary region)

T.S. Fasciola (Different regions). T.S. Ascaris (Male & Female)

T.S. Pheretima (pharyngeal and typhlosolar regions); setae, septal nephridia,spermatheca

Preparation of permanent slides -Voivox, Hydra, Obelia, Sertularia and Bougainvillia.

4. Project report.



Syllabus FOR B.Sc. : Ist -Medical

w.e.f. July 2022

ZOOLOGY

Second SEMESTER

Paper -1(Animal diversity-1)

Non-chordata;- Arthropoda to Hemichordata Paper code- 102A

External marks; 40 Total credits ; 03

Internal marks ; 10 Total marks ; 50

Course objectives: Students will get knowledge about identification identification classification and economic importance of animals from Arthropoda to hemichordata.

UNIT -1

Arthropoda - General characters and Classification up to Orders with examples.

Type study - Periplaneta,

Social organizations in Insects Honey Bee and Termites, Life-eycles.ofAnopheles.and Culex, Economic importance of insects.

UNIT-2

Mollusca - General characters and Classification upto Orders with examples

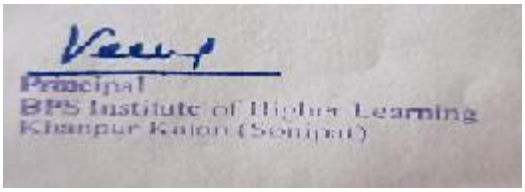
Type study - Pila

Natural history, Morphology, Histology, Pallial complex, Digestive system, Respiratory system, Excretory sysem, Nervous system, Reproductive system, Circulatory system,

Torsion and Detorsion in Gastropod

UNIT -3

Echinodermata - General characters and classification upto Orders with examples



Type study- Asterias.

Larval forms in Echinodermata, Phylogeny and Affinities of

Echinodermata.

- Asterias.

UNIT -4

Hemichordata - General characters and Classification up to Orders with examples.

Type study Balanoglossus.

Habitat and Habits, External characters, Bodywall, Coelom, Skeleton, Digestive system, Ciculatory system, Respiratory system, Excretory system, Nervous system, Reproductive system, Affinities, Aristotles Lantern.

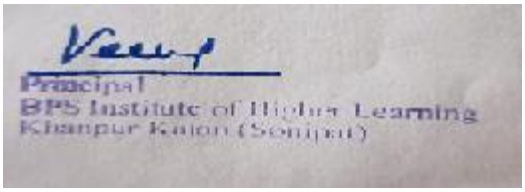
Course Outcomes:

1. Students get knowledge about Siriculture, Apiculture in which they can make their career.
2. Taxonomist is a great career option nowadays.

Note for examiner -

1.The candidate shall attempt five questions in all, including the compulsory question. The examiner will set nine questions, including one objective type questions covering the entire syllabus, remaining Eight questions, Two from each unit.

2. All questions carry equal marks.



Syllabus FOR B.Sc. : Ist -Medical

w.e.f. July 2022

ZOOLOGY

Second SEMESTER

Paper 2 (Ecology) Paper code -102B

External marks; 40 Total credits ; 03

Internal marks ; 10 Total marks ; 50

Course objectives: Students will get awareness natural resource issue, human activities affecting natural environment in terms affecting ecosystem

UNIT- 1

Ecology- Defination, Significance, Concept of Habitat and Ecological Niche, Subdivisions and scope of Ecology.

Ecosystem- Components, Energetics, Fod web, Introduction to major ecosystems of the World

UNIT-2

Ecological factors-Abiotic factors- Temperature, Light, Soil, Distribution of anmals based on ecological factors.

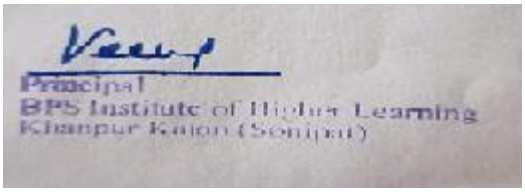
Biotic Community- Characterstics, Ecological succession.

Nutrient Cycles- Biogeochemical cycles and concept of limiting factors.

UNIT-3

Ecological Adaptations- Morphological, physiological and behavioral adaptations in animals in different habitats.

Population- Characterstics, Growth and regulation of population, Migration in fishes and birds, Parental care in animals.



Inter- and intraspecific relationship;- Competition, Predation, Parasitism, Commensalism and Mutualism.

UNIT-4

Natural Resources- Renewable and nonrenewable natural resources and conservation of natural resources.

Environmental Pollution- Causes, impact and control of environmental pollution- Air, Water, Soil and Noise, Environmental degradation.

Course Outcomes:

1. Students will be able to understand biological diversity conservation and sustainable development.
2. They will be able to understand the animal adaptations.

Note for examiner

1.The candidate shall attempt five questions in all, including the compulsory question. The examiner wil set nine questions, including one objective type questions covering the entire syllabus, remaining Eight questions, Two from each unit.

2. All questions carry equal marks.

3. Max. marks; 40

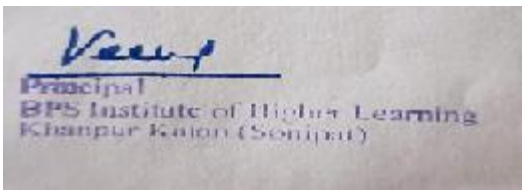
4.Time, 3 hours.

Suggested Books-

Dhami, P.S. and Dhami,J. K., Ecology and Evolution, Pradeep publications, Jalandhar.

Kotpal, R.L., Conceps of ecology , Vishal Publications.

Edward J. Kormondy, Concepts of ecology



Syllabus FOR B.Sc. : Ist -Medical

w.e.f. July 2022

ZOOLOGY

Second SEMESTER

Paper code- ZOP-102

Prcticals Based on the Theory Paper

Total Marks = 50 (External=40 + Internal=10)

Time:-4 hours

1. Study of museum specimen -

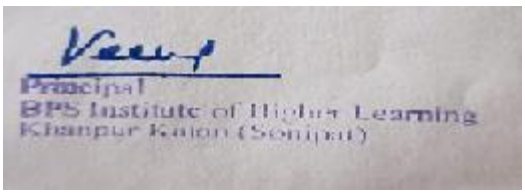
A. Arthropoda ;-Periplaneta, Palaemon, Lobster, Cancer, Sacculina, Eupagurus, Lepas, Balanus, Cyclops, Daphnia, Lapisma, Schistocerca, Poecilocerus, Gryllus, Mantis, Cicada, Forficula, Dragonfly, Termite queen, Bug, Moth, Beetle, Polistes, Apis, Bombyx, Pediculus, Millipede, Centipede, Palamnaeus, Aranea, Limulus.

B. Mollusca ;- Mytilus, Ostrea, Cardium, Pholas, Solen, Pecten, Haliotis, Patella, Aplysia, Doris, Limax, Loligo, Sepia, Octopus, Nautilus shell, Chiton D and Dentalium.

C. Echinodermata;- Asterias, Echinus, Ophiothrix, Antedon, Cucumaria, Astrophyton.

D. Hemichordata ;-Balanoglossus.

2.Study of the following permanent stained preparations-



a. Insect trachea, mouth parts of Priplaneta. e, Codhidi um lasva

b. Radula and osphradium of Pila.

c. T.S. Starfish.

d. T.S. Balanoglossus

3.Preparation of following slides-

a. Mouth parts and trachea of Grasshopper/ CocKoach

b. Permanent slides of mosquito larva.

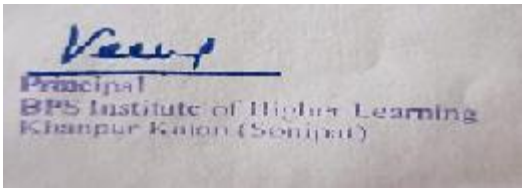
4. Ecology

a. Study of animal adaptations with help of specimens, charts and models.

b. Study of Zoogeographical regions and their fauna.

C. Study of biotic components of an ecosystem- pond ecosystem, artificial ecosystem

d. Study and preparation of zoogeographical charts.



Syllabus FOR B.Sc. : 2nd (Medical)

w.e.f. July 2022

ZOOLOGY

THIRD SEMESTER

Animal Diversity Chordata-1

(Protochordate to Amphibia) Paper Code: Z00-201A

L-T- P Total Credits:03

3 - - - Total Marks:50

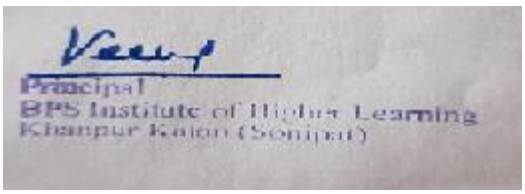
External Marks: 40

Internal Marks: 10

Course objectives: Students will enhance their understanding about anatomical structures to reveal the relationships between structure functions taxonomy Ecology of animals from Protochordate to amphibia.

UNIT -1

Chordate General characters and classification up to order level with examples.



1. Origin and evolutionary tree of chordates.

2. Urochordate General characters and classification up to order level with examples.

Type study of Herdmania (Urocordate); Systematic position, Natural history, External characters,

Digestive system, Blood vascular system, Respiratory system,Nervous system and sense organs, Excretion, Reproductive system, Larva, Adaptations..

UNIT-2

Cephalochordata : General characters and classification up to Orders with examples;-

Type study - Amphioxus.

Cyclostomes : General characters and classification up to Orders with examples-

Type study - Petromyzone.

Systematic position, Natural history, External characters, Body wall, Coelom, Digestive system Respiratory system,Circulatory system, Nervous system, Reproductive system, Excretory system, Ammocetoes larva.

UNIT-3

Pisces: General characters and classification up to Orders with examples;-

Type study of Labeo

Systematic position, Natural history, Morphology, Digestive system, Respiratory system, Circulatory system, Nervous system, Reproductive system, Excretory systm,

Scales & fins of fishes, Parental care in fish, Fish Migration

UNIT -4

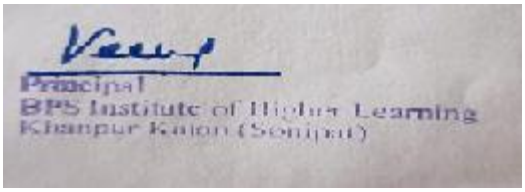
Amphibia; General characters and classification upto Oders with examples-

Type study of frog (Rana Tigrina). Systematic position, Natural history, Morphology, Digestive system, Respiratory system, Circulatory system, Nervous system, Reproductive system, Excretory system, Sense organs. Adaptations.

Course Outcomes:

1. This field imparts knowledge regarding various chordate protochordata to amphibia and their regulatory processes to safeguard them.

Note for examiner-



1.The candidate shall attempt five questions in all, including the compulsory question. The examiner will set nine questions, including one objective type questions covering the entire syllabus, remaining Eight questions, Two from each unit.

2. All questions carry equal marks.

3. Max. marks; 40

4.Time; 3 hours.

Suggested Books:

1. Colbert, E.H., Evolution of vertebrates, II Edition Wiley Ltd. 1989.

2. Dhami,P.S. and Dhami, J.K., Vertebrates, R. Chand and Co, New Delhi, 1997.

3 Kotpal's vertebrates.

Syllabus FOR B.Sc. : 2nd (Medical)

w.e.f. July 2022

ZOOLOGY

THIRD SEMESTER

Paper 2 Developmental biology and Evolution — Paper Code: Z00-201B

L-T- P — Total Credits:03

3 - - - — Total Marks:50

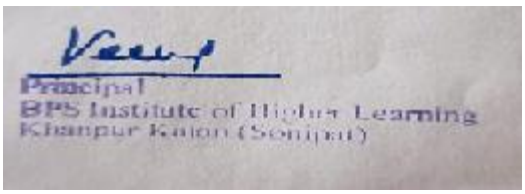
External Marks: 40

Internal Marks: 10

Course objectives: Students make their knowledge about basic concepts of development biology and evolutionary biology.

UNIT- 1

Developmental biology-



Historical perspectives, Aims and scope of developmental biology. Generalize structure of mammalian ovum & sperm/,. Spermatogenesis and Oogenesis ,Fertilization, Parthenogenesis, Different types of eggs and patterns of cleavage. Process of blastulation and Fate-map construction in chick.

UNIT- 2

Gastrulation in chick upto the formation of three germinal layers. Elementary knowledge of primary organizer. Concepts of competence, determination of differentiation. Extra embryonic membranes and Regeneration.

UNIT- 3

Origin of life. , Zoogeological time cale

Concept and evidences of organic evolution Theories' of organic evolution:- Lamarckism, Evolution Darwinism, Neo- Darwinism,

UNIT -4

De' Varies mutation theory, Modern theory of evolution Concept of micro-evolution, macro evolution and mega-evolution. Concepts of species, Modes of speciation. Evolution of man.

Course Outcomes:

1. Students will be able to know about Developmental patterns and their relationship with evolution.

2.Students get to know about the genetic ancestors.

Note for examiner

1,The candidate shall attempt five questions in all, including the compulsory question. The examiner will set nine questions, including one objective type questions covering the entiresyllabus, remaining Eight questions, Two from each unit.

2. All questions carry equal marks.

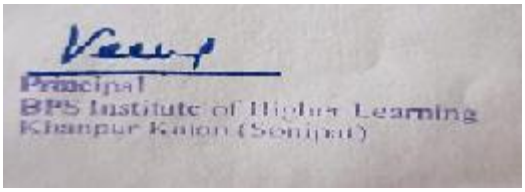
3. Max. marks ; 40

4.Time ; 3 hours.

Suggested Book:

1.Dobzhansky, Ayaia, Stebbins & valentine, Evolution, W.H. Freeman, 1952.

2 Colbert, E.H., Evolution of Vertebrates, II Edition Wily Easten Ltd.,1989



Bhamrah, H.S. Juneka, K., Cytogenetics & Evolution, Anmol Publication Pvt.Ltd. 1993.

4 Davenport. An out line of Animal Development Addisom-Wesly. Gilbert, S.F. (1991) Developmental Biology. Sinaurer AssociatesInc Publishers.

5.Oppenheimor, S.B.(1981) Insoduction to Embryology, Allyn and Baeon. Sussman

6.Animal Growth and Developmental Prentiahall.

Syllabus FOR B.Sc. : 2nd (Medical)

w.e.f. July 2022

ZOOLOGY

THIRD SEMESTER

Practical

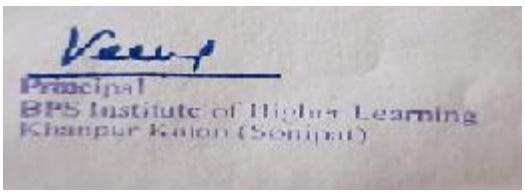
Paper Code: ZOP-201

Total Marks = 50 (External=40 + Internal=10)

Time:- 4 hours

Study of Museum Specimens

Protochordata :



Branchiostoma, Balanoglossus, Herdmania and a colonial Urochordalta

Fishes:

Petromyzone, Pristis, Zygarna, Opiocephalus Clarius. Labeo, Mystis, Anguila, Syngnathus, Tetradon, Ostacodon, Solea, Exocoetus.

Amphibia:

Salamender, Necturus, Hyla, Raeophorus, Bufo, limbless ämphibian.

Skeleton: Labeo and Frog.

Temporary mounts: Placoid, cycloid and ctenoid scales. Wheel organ of amphioxus.

Dissection:

Herdmania: General Anatomy

Labeo: Digestive System, Reproductive system and Excretory System. (Demonstration only)

Slides:

Study of permanent slides of WM of chick and frog embryo (13-18h, 24-36h, 36-48h, 48-72h)

Window preparation and identification of development in chick egg.

Project : Based om theory papers.

Syllabus FOR B.Sc. : 2nd (Medical)

w.e.f. July 2022

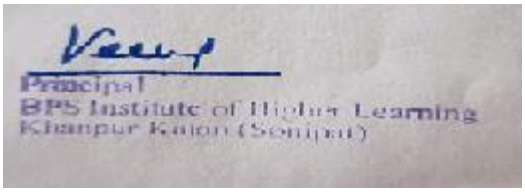
ZOOLOGY

FOURTH SEMESTER

Paper 1 (Animal diversity-4)

Chordata- Reptilia to Mammals Paper code ZOO- 202A

L-T- P Total Credits:03



3 - - - Total Marks:50

External Marks: 40

Internal Marks: 10

Course objectives: Students will be able to understand, classify and identify diversity of animals from reptilia to Mammals.

UNIT -1

Reptila;- General character and classification up to orders with examples

Type study - Lizard

Natural history, external characters, digestive system, respiratory system, circulatory system, nervous system, sense organs, excretory system, adaptations, systematic position

Reptilia- Origin, Evolutionary tree, extinct reptiles.

Poisonous and non poisionous snakes, Poison apparatus in snakes

UNIT-2

Aves Genral characters and classification up to orders with examples.

Type study of Pigeon, Systemetic position, Natural history, external characters, digestive system, respiratoy system, circulatory system, nervous system, sense organs, excretory system, reproductive system, adaptations.

Flight adaptations, Aerodynamics in birds, Migration in birds.

UNIT -3

Mammals;- Genral characters and classification up to orders wih examples.

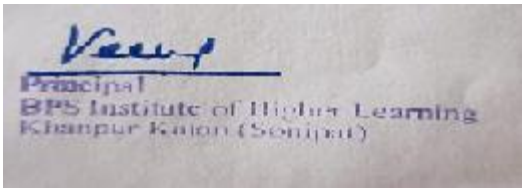
Type study - Rat

Systematic position, natural history, external characters, digestive system, respiratory system, circulatory system, nervous system, sense organs, excretory system, reproduction and gestation, adaptations.

UNIT4

Dentition- Structure of tooth, types of teeth dental formulac of man. rat, cow. horse, pig, elephant

Stomach of ruminants



Adaptive Radiation in prototheria, metatheria and cuthena.

Skin and its Derivatives:- hair, nail, horns

Course Outcomes:

1. Studying this a student may become a protector preserver and Promoter of life .
2. They get employment in Forestry, museum and zoological parks.

Note for examiner-

1.The candidate shall attempt five questions in all, including the compulsory question. The Examiner will set nine questions, including one objective type questions covering the entire syllabus, remaining Eight questions, Two from each unit.

2.All questions carry equal marks.

3. Max. marks; 40

4.Time; 3 hours.

Suggested Books;

Dhami, P.S. and Dhami, J.K., Chordate Zoology, Pradeep Pub, Jalandher, India

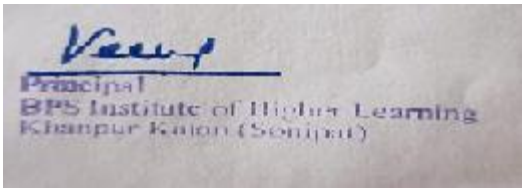
Jorden, E.L., and VERMA, P.S. , Chordate Zoology

Syllabus FOR B.Sc. : 2nd (Medical)

w.e.f. July 2022

ZOOLOGY

FOURTH SEMESTER



Paper 2 Physiology | Paper code ZOO- 202B

L-T- P | Total Credits:03

3 - - - | Total Marks:50

External Marks: 40

Internal Marks: 10

Course objectives:

1. Students will get to know the mechanism that work to keep the animal body alive .
2. They can make their knowledge about the working of some instruments like sphygmomanometer hemocytometer and hemometer.

UNIT -1

Digestion-Nutritional components; Proteins, carbohydrates, vitamins , minerals types of nutrition and feeding digestion and dietary constituents, viz. Lipids, proteins, carbohydrates, nucleic acids, symbiotic digestion absorption. control of enzyme secretion.

UNIT-2

Circulation- Origin, conduction and regulation of heart beat, cardiac cycle, electrocardiogram, cardiac outputi, fluid pressure and flow pressure in closed and open circulatory system, composition and functions of blood and lymph, mechanism of coagulation factors, anticoagulants, haemopoieses.

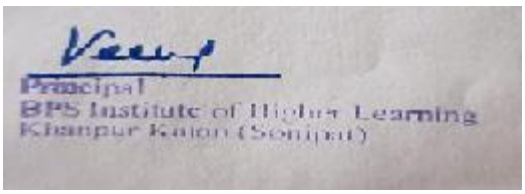
UNIT -3

Respiration - Exchange of respiratory gases, transport of gases, lung air volumes, oxygen dissociation curve of haemoglobin, Bohr's effect, hamburger phenomenon, control of respiration. Control and Coordination- Nervous integration and chemical integration of endocrinology, nature, origin, propagation of nerve impulse, structure and mechanism of hormone action, physiology of pituitary, thyroid, parathyroid, adrenal, pancreas, gonads.

UNIT-4

Excretion- Patterns of excretory products viz, amonotelic, ureotelic, uricotelic; ormithine cycle, urine formation, counter-current mechanism, osmo regulation, micturition

Reproduction-Gametogenesis, structure of gametes, ovulation, capacitation, fertilization, gestation, parturition.



Course Outcomes:

1. Students can make their career in developing vaccines and other pharmaceuticals that affect their body by knowing the fundamental processes like digestion circulation respiration excretion chemical control and coordination etc.
2. They can make their career in forensic science Labs.

Note for examiner -

1.The candidate shall attempt five questions in all, including the compulsory question. The examiner will set nine questions, including one objective type questions covering the entire syllabus, remaining Eight questions, Two from each unit.

2. All questions carry equal marks.

3. Max. marks, 40

4.Time: 3 hours.

Suggested Books;

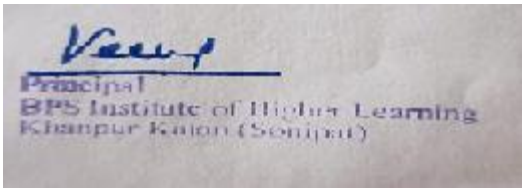
Dhami, P.S. and Dhami, J.K., Zoology-Biochemistry and animal physiology, Pradeep Pub, Jalandher, India.

Eckert and Randall, Animal Physiology.

Syllabus FOR B.Sc. : 2nd (Medical)

w.e.f. July 2022

ZOOLOGY



FOURTH SEMESTER

Practical

Paper Code: ZOP-202

Total Marks = 50 (External=40 + Internal=10)

Time:- 4 hours

Study of museum specimens -

Reptilia Specimen;: Chelone Testudo, Trionyx. Hemidactylus, Calots, Varanu5 Uromastix, Ophiosaurus, Chamaeleon, Draco, Python, Eryx. Natrix Piyas, Bungarus, Naja, Hydrus, Enhydrina Viper, Crocodilus.

Osteology ;Skeleton of Varanus

Aves Specimen: Casuarius, Arden, Anas, Milvis, Pavo, Eudynamis. Tyto. Alerdo, Halcyon.

Temporary mounts- barbs, study of a dozen common birds of Haryana, types of feathers.

Ostology ;skeleton of fowl, different types of palate in birds. Mammalian Specimen; Ornithorynchus, Pteropus, Echidna, Macropus, Dedelphis, Cannis, Loris, Oryctolagus, Funambulus, Herpestes, Capra, Cat, Langur, Macacca, Hedgehog Shrew, Insectivorous bat.

Osteology : skeleton of rabbit.

Permanent Slides;- Mammalian skin, salivary glands, oesophagus, stomach, duodenum, ileum, rectum, liver, pancreas, spleen, trachea, lung, kidney, cartilage, Bone, pituitary, adrenal, thyroid, parathyroid, ovary and testis.

Effects of isotonic, hypotonic, hypertonic solution on erythrocytes.

Enumeration of red blood cells using haemocytometer.

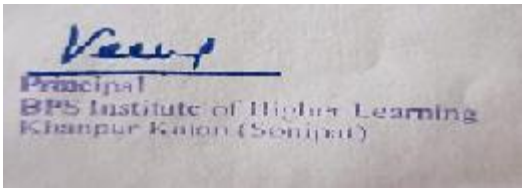
Enumeration of total and different types of white blood cells.

Estimation of haemoglobin n content of blood using Sahli's haemometer.

Preparation of haemin crystals. ; BleoD CGRoUPING

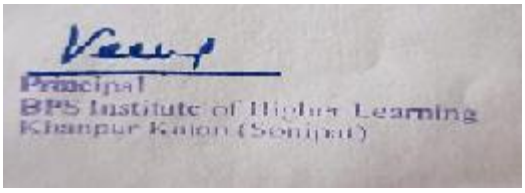
Recording of blood pressure by using a sphygmomanometer.

Report on ficld trip to zoological park, national museum of natural history or a



Wild life sanctuary and national park.

Syllabus FOR B.Sc. : 3rd (Medical)



w.e.f. July 2022

ZOOLOGY

FIFTH SEMESTER

Paper 1 Economic Zoology — Paper code ZOO-301A

L-T- P — Total Credits:03

3 - - - — Total Marks:50

External Marks: 40

Internal Marks: 10

Course objectives: This course helps students to know different type of insect pests that harm crops, stored grains and vegetables.

UNIT-1

Study of importance of insect pests of crops with their systemic position, habit and nature of damage caused-

Crops:

1-Sugarcane-

a) Sugacane leaf hopper (Pyrilla perpusilla)

b) Sugarcane white fly (Aleruolobus barodensis)

c) Sugarcance top borer (Scirpophaga nivella)

d)Sugarcance root borer (Emalocera depresella)

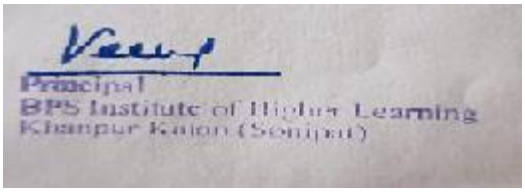
e)Gurdaspur boror (Bissetia Steniellus)

Life cycle and control of Pyrilla perpusilla only.

2-Cotton:

f)Pink bollworm (Pectinophora gossypiela)

g) Red cotton bug (Dysdercus koenigi)



h)Cotton grey weevil (Myllocerus undercimpustulatus)

i) Cotton jassid (Empoasca devastans)

Life cycle of control of Pectinophora gossypiella.

3- Paddy

a. Gundhy bug (Leptocorisa varicormus)

b. Rice grasshopper (Hieroglyphus baian)

C. Rice stem borer (Scirpophaga incertullus)

d. Rice hipsa Hispa armigera)

Life cycle and control of Leptocorisa varicorn:

UNIT-2

Study of importence of insect pests of crops and vegetables, with their systematic position, habit and nature of damage caused

Wheat- Wheat stem borer- Sesamia inferens, with systematic position, habit,

nature of damage caused, life cycle.

Vegetables pests-

a) Raphidopalpa faveicollis-The red pumpkin beetle.

b)Dacus cucurbitas-The red pumpkin fruit fly.

c)Tetarnychus tecarius-The vegetable mite.

d) Epilachna -The Hadda beetle

Life cycle & control of Aulacophora faveicollis

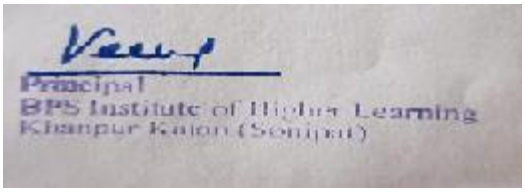
Pests of stored grains:-

a) Pulse beetle (Callosobruchus maculates)

b) Rice weevil (Sitophilus oryzae)

c)Wheat weevil (Trogoderma granarium)

d) Lesser grain borer (Rhizopertha dominica)



e) Grain and flour moth (Sitotroga cerealell)

UNIT-3

Pest Control:-

1)Physical Control

ii) Chemical Control ; history, categories of pesticides, from each category of pest against which they can usesd, insect repellent and attractant

iii) Biological Control; History, requirement and precautions, a feasibility of biological agent for control

iv)Hormonal Control ; Mechanical control, physical control, cultural methods, sterilization, pheromones, allochemicals;- allomones, kairomones, synomones..

v)Legal Control.

Integrated pest management.

UNIT 4

.Some Useful insects;-

Honey Bee - systematie position, general appearance, social organization, products, composition and uses of honey and other byproducts of apiculture, life cycle.

Lac insact - systematic position, general appearance, culture, composition and uses of lac, life cycle.

Silk moth - systematic position, general appearance, culture, types of silk, composition and uses of silk, life cycle.

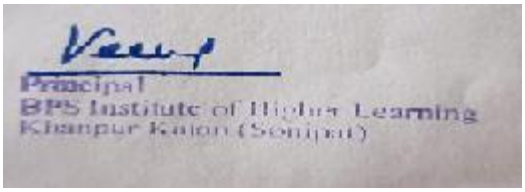
Course Outcomes:

1. Knowledge in this field can be used in research by knowing life cycle of pest and their eradication methods by using Chemicals or by genetic modification.
2. It is a vast field of research having great career opportunities

Note for examiner -

1.The candidate shall attempt five questions in all, including the compulsory question. The examiner will set nine questions, including one objective type questions covering the entire syllabus, remaining Eight questions, Two from each unit.

2. All questions carry equal marks.



3. Max. marks; 400

4.Time, 3 hours.

Suggeststed books:-

1. Perry A.S Yamamoto, I.I shaay and R.Perry , Inseetides in Agrivulture and

Environment-Narora Publishing House.

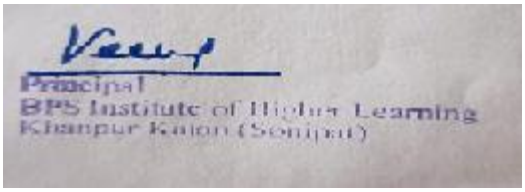
2. B.S Parmer && S.S Tomar Pesctides formulation CBS PublisherS and

distributors, New Delhi .

3. R.Wade, M.Dekker, Pesticide Formulation.

4. G. Shukla G.S Upadhay V.B Rastogi publications Meerut

5 Mcden's Zoology



Syllabus FOR B.Sc. : 3rd (Medical)

w.e.f. July 2022

ZOOLOGY

FIFTH SEMESTER

Paper 2 Genetics | Paper code ZOO-301B

L-T- P | Total Credits:03

3 - - - | Total Marks:50

External Marks: 40

Internal Marks: 10

Course objectives: Genetics provide the knowledge about inheritance pattern of genes and cause of genetic disorders.

UNIT 1

DNA as Information:

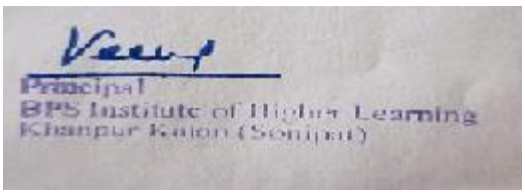
Discovery of Gene, Structure of Gene, Mapping of gene, Translation, Transcription, DNA Replication

UNIT 2

Recombination in bacteria (Conjugation, transformation, transduction).

Mutation:- Spontaneous & induced mutations, gene mutations, physical and chemical basis of mutations, transversion, structural chromosomal abberrations.

UNIT 3



Applied Genetics:-

Human genetics: Human karyotype. Chromosomal abnormalities involving autosomes and sex chromosomes, monozygotic twins, sex determination, inborn errors of metabolism

UNIT 4

Eugenics, euthenics & cuphenics Genctic counseling. pre-natal diagnostics DNA-finger printing transgenic animals. Population genetics.

Course Outcomes:

1. This course will enhance the knowledge behind genetic disorders and gene mutations which are closed by Chemicals drugs and harmful radiations which could be avoided by a person and help in making eco friendly planet.

Note for examiner

1.The candidate shall attempt five questions in all, including the compulsory question. The examiner will set nine questions, including one objective type questions covering the entire syllabus, remaining Eight questions, Two from cach unit.

2. All questions cary cqual marks.

3. Max. marks: 40

4.Time: 3 hours.

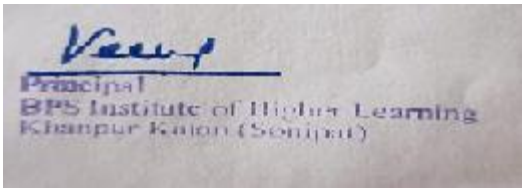
Suggested Books:-

Dhami, P.S. and Dhami, J.K., Zoology-molcular biology and genetics. Pradeep Pub., Jalandher, India.

Benjamen P.A.B. (2002) Genetics : A conceptual Approach, W.H. Freeman and Co. New York.

Brown, T.A. Genome : John Wiley & Sons (Asia) PTE Ltd.

Russel, P.J. (1998) Genetics: The Bebjamin/ Cummings Publishing cone. Inc USA



Syllabus FOR B.Sc. : 3rd (Medical)

w.e.f. July 2022

ZOOLOGY

FIFTH SEMESTER

Practicals

Paper code - ZOP 301

Total Marks = 50 (External=40 + Internal=10)

Time:-4 hours

1. External morphology, identification marks, nature of damage and host of the

Following pests

Sugarcane - Sugarcane leaf hopper, sugarcane white fly, sugarcane top borer,

Sugarcane root borer, gurdaspur borer

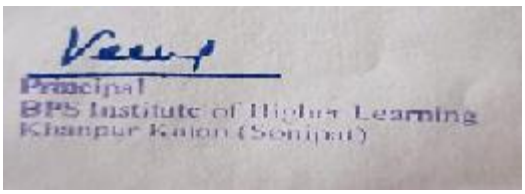
Cotton - Red cotton bug.

Wheat - Wheat stem borer.

Peddy- Gundhi bug, rice grasshopper, rice stem borer, rice hispa.

Vegetable -Aulacophora faviecollis, Dacus cucurbitas, Tetranychus tecarious, pilachna.

Stored grains - Pulse beetle, rice weevil, grain and flour moth, red flour beetle, lessor grin borer.



2. Stages of life history of silk moth and honey bee.

3. Demonstration of law of segregation, independent assortment and epistasis.

Numerical for segregation and independent assortment.

4 Segregation demonstration in preserved material.

5. Inheritance other human characterstics, ability to test PTC, thiourea.

6. Study of polytene chromosomes of Chironomous / Drosophila throughpermanent Slide.

7. Dermatography - Palm print taking and finger ip patterns.

8. Collection and identification of pest.

Syllabus FOR B.Sc. : 3rd(Medical)

w.e.f. July 2022

ZOOLOGY

SIXTH SEMESTER

Paper 1 Aquaculture — Paper code ZOO-302A

L-T- P — Total Credits:03

3 - - - — Total Marks:50

External Marks: 40

Internal Marks: 10

Course objectives: Students get knowledge about fish culture, pig culture and poultry culture.

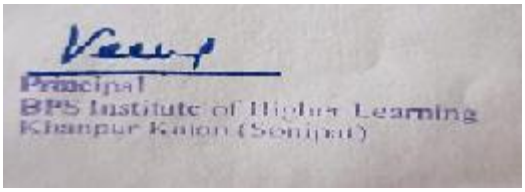
UNIT 1

Aquaculture:

Introduction to world Fisheries, Fresh water fishes of India River System, reservoir, pond/tank fisheries, captive and culture Fisheries, cold water fisheries. Fishing crafts & gears,

UNIT 2

Seed production, Nutrition, Fish Cultture technology, Mono culture, Composit Culture.



Food fish, Crustaceans, Molluscs , and their culture.

UNIT 3

Poultry Culture:- Introduction, Habitar, Houses, Food & Feeding of fowl. Breeds of fowl.

Precations for Hatching, rearing of chicken. Poultry Products. Rearing of eggs

UNIT 4

Piggery Introduction, Habitat, Houses, Food and Feeding Breeds. Products.

Course Outcomes:

1. Knowledge about the process of aquaculture, poultry culture and Piggy products iwhich make their career in agriculture field and aquaculture that are in a very high demand nowadays.
2. This field helps in increasing economy of country by providing employment.

Syllabus FOR B.Sc. : 3rd(Medical)

w.e.f. July 2022

ZOOLOGY

SIXTH SEMESTER

Paper 2(Biomolecules, Biotechnology and Bioimfarmatics) Paper code ZOO-302B

L-T- P Total Credits:03

3 - - - Total Marks:50

External Marks: 40

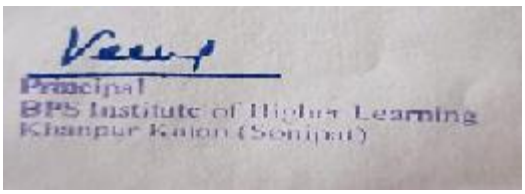
Internal Marks: 10

Course objectives: Knowledge about cell culture, tissue culture, in vitro synthesis, transgenic animals and their role in environment helps the students to increase their understanding.

UNIT-I

Defination, scope and history of biotechnology, Biotechnology tree, Structure of DNA and RNA,

Basic tools in Biotechnology-



1-Enzymes, types of enzymes, most commonly used enzymes

2-Vectors; types of vectors.

3-Passenger DNA.

UNIT-2

Techniques in Biotechnologys-

Agarose gel electrophoresis,

Isolation and purification of nucleic acid,

Isolation of chromosomes,

Nucleic acid blotting techniques,

DNA sequencing, Alternate method of DNA sequencing,

Chemical synthesis of DNA,

Methods of gene transfer,

Polymerase chain reaction,

Production of monoclonal antibodies,

UNIT-3

Construction of gene library,

Radiolabeling of nucleic acid.

Cloning of DNA,

Chimeric DNA,

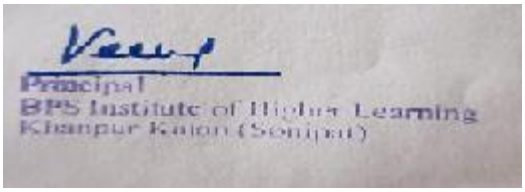
Copying of mRNA into DNA

Regulation of gene expression

UNIT 4

CULTURE TECHNOLOGY AND BIOINFORMATICS

Animal cell culture, Tissue and organ cultures, Invitro Fertilization & Embryo Transfer, Transfection methods and Trans- genic animals,



Cryopreservation Defination, components of Bioinformatics, Internet and Bioinformatics.

Biological database and Application of Bioinformatics.

Course Outcomes:

1. Students gain skills in medical biotechnology, environmental biotechnology, aquaculture techniques and use of animals as bio reactors.
2. They get aware about ethical issues involved in production of transgenic animals .
3. They will be able to perform the statistical analysis of the experiment outcomes.

Note for examiner -

1.The candidate shall attempt five questions in all, including the compulsory question. The examiner will set nine questions, including one objective typc questions covering the entire syllabus, remaining Eight questions, Two from cach unit.

2. All questions carry equal marks.

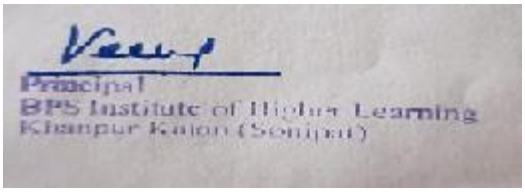
3. Max. marks; 40

4.Time; 3 hours.

Suggested Books3-

Dhami, P.S. and Dhami, J.K., Zoology, Pradeep publications, Jalandher, India.

Satayanarayan U.,Biotechnolegy, Books and Allied Pvt. Ltd.



Syllabus FOR B.Sc. : 3rd(Medical)

w.e.f. July 2022

ZOOLOGY

SIXTH SEMESTER

[Practicals]

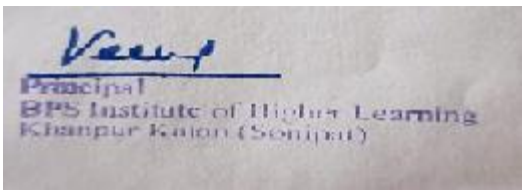
Paper code ZOP-302

Time:-4 hours

Total Marks = 50 (External=40 + Internal=10)

1.Indentification of Food Fish:

Catla, Labiorohita, L. Calbasu, Cirrhina mrigala, Barbus Sarana, Ophlocephalus punctatus,O. Marulis, 0. stariatus, Trichogaster- Fasciata, Mystus Seenghala, M. cavasius, M. tengara, Callichrous pabola, C. bimaculatus & Wallago attu etc.



2.Other aquatic Animals used as food:- Prawns, crabs, lobsters & oysters etc.

3.Structure of Mouth of different fishes in relation to feeding habits.

A study of the fish parasites.

5.A study of different types of nets. Eg. Castnet, gill, drift & drag net.

6.A visit to lake/ reservoir/ fish breeding center/ poultery.

7.Histology : Preparation of permanent histological slides of testes, Ovary, Kidney, intestine, liver of rat (Microtomy)

8. Demonstration of detailed structures of DNA & RNA through model.

9. Fish Feed formulation- Artifial

Live-Culture, indentify slideand preparation

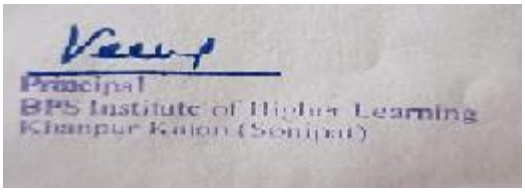
10 Fish diseases-slides (infected fishes).

11. Biotechnological techniques.

12. Fish Enemies and weed fish.

13.Use of computers in Zoology

Drug designing.



Scheme of Examination
in the subject of Botany
(B.P.S.M. Vishwavidhalya, Khanpur Kalan) w.e.f 2015

Year –I (Semester I)

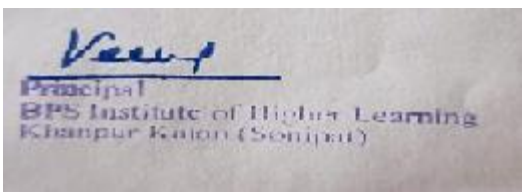
Sr. No.	Paper Code	Name of Paper	Marks		Periods (in hours)	Credits	Exam Time (in hours)
			Internal Marks	External Marks			
1	BOT- 101A	Diversity of Microbes and Cryptogams	10	40	3	3	3
2	BOT- 101B	Cell Biology	10	40	3	3	3
4	BOP- 101	Botany Practical	10	40	4	2	4

Total Marks-=150

Year –I (Semester II)

Sr. No.	Paper Code	Name of Paper	Marks		Periods (in hours)	Credits	Exam Time (in hours)
			Internal Marks	External Marks			
1	BOT-102A	Diversity of Archegoniates(Bryophytes and Pteridophytes)	10	40	3	3	3
2	BOT- 102 B	Genetics	10	40	3	3	3
3	BOP-102	Botany Practical	10	40	4	2	4

Total Marks-=150



Year II (Semester III)

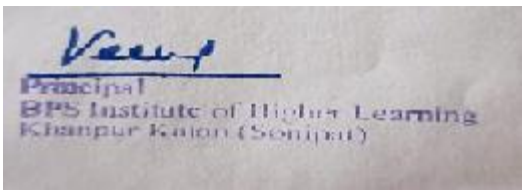
Sr. No.	Paper Code	Name of Paper	Marks		Periods (in hours)	Credits	Exam Time (in hours)
			Internal Marks	External Marks			
1	BOT-201A	Diversity and Systematics of Seed Plants-I	10	40	3	3	3
2	BOT- 201B	Plant Anatomy	10	40	3	3	3
3	BOP-201	Botany Practical	10	40	4	2	4

Total Marks-=150

Year II (Semester IV)

Sr. No.	Paper Code	Name of Paper	Marks		Periods (in hours)	Credits	Exam Time (in hours)
			Internal Marks	External Marks			
1	BOT-202A	Diversity and Systematics of Seed Plants-II	10	40	3	3	3
2	BOT- 202B	Reproduction and Embryology in Flowering Plants	10	40	3	3	3
3	BOP-202	Botany Practical	10	40	4	2	4

Total Marks-=150



Year III (Semester V)

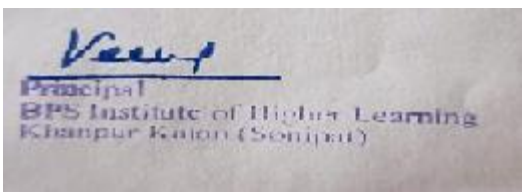
Sr. No.	Paper Code	Name of Paper	Marks		Periods (in hours)	Credits	Exam Time (in hours)
			Internal Marks	External Marks			
1	BOT-301A	Plant Physiology	10	40	3	3	3
2	BOT- 301B	Plant Biochemistry and Biotechnology	10	40	3	3	3
3	BOP-301	Botany Practical	10	40	4	2	4

Total Marks-=150

Year III (Semester VI)

Sr. No.	Paper Code	Name of Paper	Marks		Periods (in hours)	Credits	Exam Time (in hours)
			Internal Marks	External Marks			
1	BOT-302A	Plant Ecology	10	40	3	3	3
2	BOT- 302B	Economic Botany	10	40	3	3	3
3	BOP-302	Botany Practical	10	40	4	2	4

Total Marks-=150



Scheme of Examination
in the subject of Zoology
(B.P.S.M. Vishwavidhalya, Khanpur Kalan) w.e.f 2022

Year –I (Semester I)

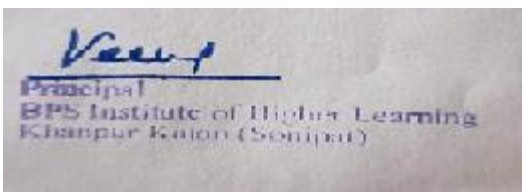
Sr. No.	Paper Code	Name of Paper	Marks		Periods (in hours)	Credits	Exam Time (in hours)
			Internal Marks	External Marks			
1	ZOO- 101A	Animal diversity-1	10	40	3	3	3
2	ZOO- 101B	Biochemistry and cell biology	10	40	3	3	3
4	ZOP- 101	Zoology Practical	10	40	4	2	4

Total Marks-=150

Year –I (Semester II)

Sr. No.	Paper Code	Name of Paper	Marks		Periods (in hours)	Credits	Exam Time (in hours)
			Internal Marks	External Marks			
1	ZOO-102A	Animal diversity-2	10	40	3	3	3
2	ZOO- 102 B	Evology	10	40	3	3	3
3	ZOP-102	Zoology Practical	10	40	4	2	4

Total Marks-=150



Year II (Semester III)

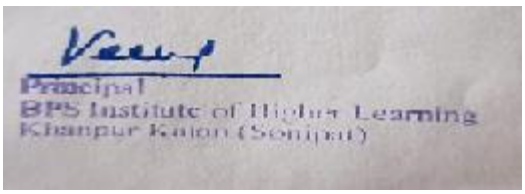
Sr. No.	Paper Code	Name of Paper	Marks		Periods (in hours)	Credits	Exam Time (in hours)
			Internal Marks	External Marks			
1	ZOO-201A	Animal diversity-3	10	40	3	3	3
2	ZOO- 201B	Development biology and Evolution	10	40	3	3	3
3	ZOP-201	Zoology Practical	10	40	4	2	4

Total Marks-=150

Year II (Semester IV)

Sr. No.	Paper Code	Name of Paper	Marks		Periods (in hours)	Credits	Exam Time (in hours)
			Internal Marks	External Marks			
1	ZOO-202A	Animal diversity-4	10	40	3	3	3
2	ZOO- 202B	Physiology	10	40	3	3	3
3	ZOP-202	Zoology Practical	10	40	4	2	4

Total Marks-=150



Year III (Semester V)

Sr. No.	Paper Code	Name of Paper	Marks		Periods (in hours)	Credits	Exam Time (in hours)
			Internal Marks	External Marks			
1	ZOO-301A	Economic Zoology-1	10	40	3	3	3
2	ZOO- 301B	Genetics	10	40	3	3	3
3	ZOP-301	Zoology Practical	10	40	4	2	4

Total Marks-=150

Year-**III (Semester VI)**

Sr. No.	Paper Code	Name of Paper	Marks		Periods (in hours)	Credits	Exam Time (in hours)
			Internal Marks	External Marks			
1	ZOO-302A	Aquaculture	10	40	3	3	3
2	ZOO- 302B	Biomolecules, Biotechnology and Bioimfarmatics	10	40	3	3	3
3	ZOP-302	Zoology Practical	10	40	4	2	4

Total Marks-=150