# Dr. A.P.J. Abdul Kalam University, Indore (M.P)

## Scheme of Examination
## B.Sc.
## Semester-IV
## (w.e.f. July 2016 Onwards)

**(Non Grading)**

| Course Name | Subject | Theory Max. Marks | | | | Practical Max Marks | | Total |
|---|---|---|---|---|---|---|---|---|
| | | Internal | | External | | Max Marks | Min Marks | |
| | | Max | Min | Max | Min | | | |
| Foundation Courses | HINDI+ ENGLISH **FCS 401 HE** | 10+05=15 | 05 | 50+35=85 | 28 | - | - | 100 |
| | Environmental Science **FCS 402 EP** | 15 | 05 | 35 | 12 | - | - | 50 |
| B.Sc. Pharma Chemistry | BOTANY **BSB 401 T** | 15 | 05 | 85 | 28 | - | - | 100 |
| | BOTANY **BSB 401 P** | - | - | - | - | 50 | 17 | 50 |
| | CHEMISTRY **BSC 402 T** | 15 | 05 | 85 | 28 | - | - | 100 |
| | CHEMISTRY **BSC 402 P** | - | - | - | - | 50 | 17 | 50 |
| | PHARMA CHEMISTRY **BSP404 T** | 15 | 05 | 85 | 28 | - | - | 100 |
| | PHARMA CHEMISTRY **BSP404 P** | - | - | - | - | 50 | 17 | 50 |
| **Total** | | | | | | | | 600 |

# Dr. A.P.J. Abdul Kalam University, Indore (M.P)

B.Sc. Under Graduate Semester wise Syllabus

(w.e.f. session 2016 onwards)

**Class:-B.Sc.**

**Semester: - IV Semester**

**Subject:-Botany (BSB401T)**

**Paper:-Plant Ecology, Biodiversity and Phytogeography**

**Marks 85+15 CCE**

**UNIT:- I Ecosystems:** Structure and types, Biotic and Abiotic components, Trophic levels, Food chain, Food web, Ecological pyramids, Energy flow; Biogeochemical cycles: Concept, Gaseous and Sedimentary cycles, Carbon, Nitrogen, Phosphorus and Sulfur cycle.

**UNIT:-II Ecological adaptations:** Morphological, Anatomical and Physiological responses Water adaptation (Hydrophytes and Xerophytes Temperature adaptation (Thermoperiodism and Vernalization), Light adaptation(Heliophytes and Sciophytes), Plant Succession: causes, trends and processes, Types of succession - Hydrosere and Xerosere.

**UNIT:-III Population Ecology:** Distribution patterns, Density, Natality, Mortality, Growth curves, Ecotypes and Ecads; Community Ecology: Frequency, Density, Abundance, Cover and Life forms. Biodiversity: Basic concept, definition, Importance, Biodiversity of India, Hotspots, *in situ* and *ex situ* conservation. , Biosphere reserves, Sancturies and National parks of Madhya Pradesh. Endangered and Threatended species, red data book.

**UNIT:-IV Soil:** Physico-chemical properties, Soil formation, Development of Soil Profile, Soil classification, Soil composition, Soil factors; Pollution: Definition, Types & Causes; Global warming, Climate change and Ozone hole.

**UNIT:-V Phytogeography:** Phytogeographical regions of India, Vegetation types of Madhya Pradesh. Natural resources – definition and classification. Conservation and management of natural resources. Land resources management, Water and Wet land resource management.

**The Atmosphere:** Composition and stratification; radiation flux; role of electromagnetic radiations, UV, visible spectrum; variations in temperature; wind as a factor.

**SUGGESTED READINGS:-**


- Banerjee, S.1998. Bio diversity conservation- Agrobotamica, Bikaner.
- Kumar, U.K 2006. Bio diversity principles and conservation, Agrobios, Jodhpur.
- Odum, E.P. 5Th ed. 2004 .Fundamentals of Ecology. Natraj Publisher, Dehradun.
- Puri, G.S. 1960. Indian Forest Ecology.
- Sharma, P.D. 7th ed. 1998.Ecology and Environment, Rastogi Publication, Shivaji Road. Meerut, 250002. India.
- Shukla, R. S. & Chandel, P.S. 2006. A Text book of Plant Ecology.

**Class:-B.Sc.**

**Semester: - IV Semester**

**Subject:-Botany (BSB401P)**

**Objectives :**

i) To enable the students to understand the plant in relation to environment.

ii) To develop the knowledge of different types of vegetation.

iii) To familiarize the students with conservation practices.

**Practical Scheme**
**Semester- IV**
**Scheme of practical examination**
**Marks: 50**

| | |
|---|---|
| 1-Exercise based on Ecology | 10 |
| 2- Soil Test | 5 |
| 3- Exercise based on Ecologycal adaptation | 5 |
| 4-To comment upon Phytogeographic region (model/ charts) and National Parks (Photographs). | 5 |
| 5-Spotting (1-5) | 10 |
| 6-Viva- voce | 5 |
| 7-Sessional | 10 |
| **Total:** | **50** |

B.Sc. Under Graduate Semester wise Syllabus
(W.e.f. session 2016 onwards)

**Class: - B.Sc.**

**Semester: - IV Semester**

**Subject: - Chemistry (BSC402T)**

**Marks 85+15 CCE**

**UNIT-I**

**A. Phase equilibrium:** statement and the meaning of terms: phase, component and the degree of freedom, thermodynamic derivation of the Gibbs phase rule, one component system: water, $CO_2$ and S system, two component system: solid-liquid equilibrium, simple eutectic system: Bi-Cd; Pb-Ag system, Desilverisation of lead.

**B. Solid solution:** Systems in which compound formation with congruent melting point (Zn-Mg) and incongruent melting point, (NaCl-$H_2O$) and ($CuSO_4$-$H_2O$) system, Freezing Mixtures: acetone-dry ice.

**C. Liquid- Liquid mixtures:** Ideal liquid mixtures, Raoult's and Henry's law. Non-ideal system, azeotrops; HCl-$H_2O$ and ethanol water system.

**D. Partial miscible liquids:** Phenol-water, trimethylamine – water and nicotine-water system. Lower and upper consolute temperature. Immiscible Liquids, steam distillation, Nernst distribution law: thermodynamic derivation, applications.

**UNIT II**

**Electrochemistry**

**A. Electrical transport:** conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, variation of specific conductance and equivalent conductance with dilution, Migration of ions and Kohlrausch-law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law, its uses and limitations. Debye-Huckel Onsager's equation for strong electrolytes (elementary treatment only). Transport number: Definition and determination by Hittorf method and moving boundary method.

**B. Types of reversible electrodes:** Gas metal ion, metal-meal ion, metal-insoluble salt anion and redox electrodes. Electrode reactions, Nernst equation, derivation of cell EMF and single electrode potential, standard hydrogen electrode- reference electrodes-standard electrode, standard electrode potential. EMF of a cell and its measurements, computation of cell EMF, calculation of thermodynamic quantities of cell reaction (DG, DH, K). Solubility product and activity coefficient, potentiometric and conductometric titration. Definition of pH and pK, determination of pH using hydrogen, quinhydrone and glass electrodes by potentiometric methods.

**UNIT-III**

**A. Aldehydes and Ketones :** Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes and ketones from acid chlorides, synthesis of aldehydes and ketones using. 1,3 dithianes, synthesis of ketones from nitriles and from carboxylic acids. Physical properties. Mechanism of nucleophilic additions to carbonyl group with particular emphasis on Benzoin, Aldol Perkin and Knovenagel condensations. Condensation with ammonia and its derivatives. Wittig reaction, Mannich reaction, use of acetals as protecting group. Oxidation of aldehydes, Baeyer-villiger oxidation of ketones, Cannizaro reaction. Meerwein Pondroff- Verley, Clemmesen, Wolf Kishner, $LiAlH_4$ and $NaBH_4$ reduction.

**B. Carboxylic acids:** Nomenclature, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Preparation of carboxylic, reaction of carboxylic acids. Hell Volhard Zelinsky reaction. Synthesis of acid chlorides
ester and amides reduction of carboxylic acids, mechanism of decarboxylation.

**UNIT IV**

**A. Carboxylic acids derivatives:** structure and nomenclature of acid chlorides, esters amides and acid anhydrides. Physical properties, interconversion of acid derivative by nucleophilic acyl substitution, preparation of carboxylic acid derivatives, chemical reactions. Mechanism of esterification and hydrolysis (acidic and basic).

**B. Coordination Chemistry:** MOT (molecular orbital theory) diagram for tetrahedral, square planar and octahedral complexes.

**C. Green Chemistry:** Principles, 12 tenets, their description with examples.

**UNIT V**

**A. Chemistry of Lanthanides:** Electronic structure, oxidation states, ionic radii and lanthanide contraction, complex formation, occurrence and isolation of lanthanide compounds.

**B. Chemistry of Actinides:** General features and chemistry of actinides, chemistry of separation of Np, Pu and Am from U, Similarities between the later actindies and later lanthanides. Lectures

## Suggested Books

1. Physical Chemistry-Puri, Sharma and Pathania, Vikas Publications, New Delhi
2. Physical Chemistry- G.M. Barrow, International Student Edition, McGraw Hill.
3. The Elements of Physical Chemistry, P.W. Atkins, Oxford University Press
4. Physical Chemistry, R.A. Alberty, Wiley Eastern Ltd.
5. Physical Chemistry Through problems, S.K. Dogra and S. Dogra, Wiley Eastern
6. Organic Chemistry, Morrison and Boyd, Prentice Hall.
7. Organic Chemistry, L.G. Wade Jr. Prentice Hall
8. Fundamentals of Organic Chemistry Solomons, John Wiley.
9. Organic Chemistry, Vol. I, IL IIL S.M. Mukherji, S.P. Singh and R.P. Kapoor,
10. Organic Chemistry, F.A. Carey, McGraw-Hill Inc.
11. Introduction to Organic Chemistry, Streitwiesser, Heathcock and Kosover, Macmillan.
12. Vogel's Qualitative & Quantitative Analysis Vol- 1, 2, 3, ELBS.
13. Advanced Organic chemistry, I. L. Finar, ELBS.
14. Basic Concepts of Analytical chemistry, S M Khopker, New Age International Publishers.
15. Analytical Chemistry, R.M. Verma, CBS Publication.
16. Analytical Chemistry, Skoog & West, Wiley International.
17. Essentials of Physical Chemistry, B.S. Bahl, Arun Bahl & G.D. Tuli, S. Chand & Company Ltd.
18. Atomic structure and Molecular spectroscopy, Manas Chanda, New Age International Publishers.
19. Molecular Spectroscopy, Sukumar, MJP Publishers.
20. Organic Chemistry, Mac Murrey, Pearson Education
21. Inorganic Chemistry – J.D. Lee, John Wiley
22. Inorganic Chemistry – Cotton and Wilkinson, John Wiley

Class : B.Sc. Semester IV
Subject : Chemistry
Paper : Practical

**M.M. 50**

**Time : 6 hour**

**Organic Chemistry** **12 Marks**

**Qualitative analysis**

Identification of an organic compound through the functional group analysis, determination of melting point and preparation of suitable derivatives.

**Physical Chemistry** **12 Marks**

**A.Transition temperature**

1. Determination of transition temperature of given substance by theromometric, dialometric method (e.g.) ($MnCl_2$, $4H_2O$/$SrBr_2$, $2H_2O$)

**B.Phase equilbrium**

1. To study the effect of solute (e.g. NaCl, succinic acid) on the critical solution temperature of two partially miscible liquid (e.g., phenol water system).
2. To construct the phase diagram of two component (e.g., diphenylamine benzopheone) by cooling curve method.

**C.Thermochemistry**

1. To determine the enthalpy of neutralization of weak acid/weak base versus strong acid/strong base and determine the enthalpy of ionization of the weak acid/base.

**Inorganic chemistry-Quantitative Volumetric Analysis 12 Marks**

1. Estimation of ferrous and ferric by dichromate method.
2. Estimation of copper using thiosulphate.

**Viva** **6 Marks**

**Record** **8 Marks**

# B.Sc. Under Graduate Semester wise Syllabus

(w.e.f. session 2016 onwards)

**Class: - B.Sc.**

**Semester: - IV Semester**

**Subject: - Pharma Chemistry (BSP404T)**

**Paper: - Chemistry of Natural Product**

**Marks 85+15 CCE**

## UNIT-I

**Hetrocyclic Compounds** : Nomenclature ,Structural formula and chemistry of Imidazoles Oxazoles ,Pyrazoles ,pyran , Pyrimidine ,Pyrimidine ,Indole ,Isoquinoline.

**Terpenes** : Isolation , Classification ,General methods of determining structure with references to Citral ,Terpineol ,Carvone ,Menthol ,Camphor.

## UNIT-II

**Carbohydrates** : Classification of Carbohydrates ,Monosaccharides : Glucose ,Fructose and their reaction , Cyclic structure of D-glucose ,Mutarotation .

**Diasaccharides** :Maltose Lactose ,Polysaccharides : Starch ,Cellulose .

**Glycosides** : Classification , Chemistry of Salicin , Arbutin , Amygdalin ,Sinigrin , Anthraquinone giycodsides ,tannin ,Cardiac glucosides ,Saportins

## UNIT-III

**Alkaloids** : Classification , General methods of determining structure of an Alkaloid. A general study of structure of Quinine, Morphine ,Reserpine ,Atropine

**Purines**:Ueic acid ,Caeffine ,Theobromine ,Theophylline .

## UNIT-IV

**Protines and Amino Acids** : Isolation and Classification of protine ,Hydrolysis of protine Fibrous and Globular protine ,Methods of systhesis ,Properties and Classification of amino acids Nucleoproteins ,Nucleic acids.

**Lipids** : Fats ,Oils ,Waxes ,Fattyacids , Physio –chemical properties Phospholipids ,Lecithines ,Cephalines , Plasmogens ,Glycolipids.

## UNIT-V

**Polynuclear Aromatic Hydrocarbon** : Chemistry of Naphthaline ,Anthracene and phenanthracene.

**Steroides** : Isolation ,Nomenclature ,Chemistry of Cholesterol ,Ergosterol,stigmnasterol.

**BOOKS RECOMMENDED**


1. Ashutosh kar, Medicinal chemistry ,New Age International (P) Limited,Publishers.
2. G.R.Chatwal ,Pharmaceutical Chemistry Organic Vol.II, Himalaya Publishing House , Bombay .
3. Dr.J.L. Jain,Fundamentals of Biochemistry , S.Chand &Company Ltd .New Delhi.
4. F .S. K.Barar ,Essensials of Pharmacotherapeutics , S. Chand & Company Ltd .New Delhi.
5. R. S.Gaud and Dr. G.D.Gupta , Practical Pharmaceuticals CBS Publishers and Distributors , .New Delhi
6. Harkishan sing , V.K.Kapoor, Organic Pharmaceuticals Chemistry ,Vallabh Prakashan Delhi.
7. Harkishan sing , V.K.Kapoor, Medicinal Pharmaceuticals Chemistry ,Vallabh Prakashan Delhi.
8. John H.Block ,John M.Beak ,Jr. Organic Medicinal and Pharmaceuticals Chemistry ,Lippincot Williams and Wilkins .
9. Stenlake & Beckett , Pharmaceuticals Chemistry Part I, CBS Publishers and Distributors , .New Delhi
10. O.P. Agrawal ,Advanced Organic Practical, Goyal Publishing House , Meerut (U.P)
11. Gurdeep Raj ,Advanced Inorganic Practical, Goyal Publishing House , Meerut (U.P.)
12. Paul M Dewick . , Medicinal natural products :A biosynthesus approach II edition, John Wiley &Sons.
13. Ashutosh kar Pharmacognosy & Pharmacobiotech ,New Age International (P) Limited ,Publishers.

B.Sc. Under Graduate Semester wise Syllabus

(w.e.f. session 2016 onwards)

**Practical**

**IV Semester**

**B.Sc.- Pharma Chemistry (BSP404P)**

**Examination : 4 hours**

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I **Assay :** 12 marks

( a ) Ampicillin

( b) Aspirin

( c ) Benzoic acid

( d ) Citric acid

( e ) Sodium Bicarbonate

**II Isolation** 12 marks

( a ) Casein from Milk

( b ) Lactose from Milk

( c ) Hesperdin from Orange peel

( d )Lycopene from Tomatoes

**III TLC of Drugs** 12 Marks

**IV Viva –voce** 06 Marks

**V Practical record** 08 Marks

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