A.N.U. B.PHARMACY SYLLABUS (WITH EFFECT FROM 2008 - 09 ACADEMIC YEAR)

IV/IV. B.PHARMACY (8th Semester)

801 PHARMACEUTICAL CHEMISTRY – V (NATURAL PRODUCTS) - (Theory) (75 hrs.)

Unit : 01
Carbohydrates: General aspects of mono, di and polysaccharides. Chemistry of glucose, fructose, sucrose and lactose.

Glycosides: Preparation and properties of methyl glycosides. A knowledge of the sources, chemistry and uses of cardiac glycosides and Anthraquinone glycosides, structural elucidation of amygdalin and salicin.

Unit : 02

Unit : 03
Fats and Oils: The extraction, general composition, properties and analysis of fixed oils, fats and waxes.


Unit : 04
Alkaloids: Classification, general methods of extraction and determination of chemical structure. Quantitative determination of functional groups. Determination of the structures of ephedrine, nicotine and papaverine.

Unit : 05

Unit : 06
Vitamins: Classification, determination of structures of thiamine, riboflavin and ascorbic acid, skeleton structures of vitamins official in I.P. A study of their properties, stability and uses.
IV/IV. B.PHARMACY (8th Semester)  
802 Pharmaceutical Chemistry - V  
(NATURAL PRODUCTS) (Practicals) (75 hrs.)

01*. Determination of acid value of fixed oil  
02*. Determination of saponification value of a fixed oil  
03. Determination of ester value of oil  
04*. Determination of iodine value of oil

Volatile Oils
01*. Determination of cinnamic aldehyde in cinnamon oil  
02. Determination of eugenol in clove oil  
03. Qualitative analysis of natural products (Comprises of amino acids, carbohydrates, proteins, alkaloids, glycosides, steriods, flavonoids)  
04. Isolation of casein from the milk  
05. Isolation of piperine from black pepper powder  
06*. Estimation of ephedrine hydrochloride by non aqueous titrimetry  
07*. Estimation of quinine sulphate  
08*. Extraction of caffeine from tea dust.

TEXT BOOKS:
01. Organic Chemistry - Vol. II by I.L.Finar  
02. Organic, Pharmaceutical and Medicinal Chemistry by Wilson and Gisvold.  
03. Remington’s Text Book of Pharm. Sciences.  
04. Text book of Medicinal Chemistry by A.Burger  
06. Organic chemistry of natural products by Gurdeep chatwal, volume I & II.  
07. Organic chemistry of natural products by O.P.Agharwal volume I & II.
IV/IV. B.PHARMACY (8th Semester)
MODEL QUESTION PAPER

PHARMACEUTICAL CHEMISTRY-VI (NATURAL PRODUCTS)

Time : 3 hours Max.Marks : 80

SECTION-A

Answer any FOUR questions (4 X 10 = 40 marks)

1. What are alkaloids? How are they isolated and identified?
   Discuss the structural elucidation of nicotine.
2. Classify vitamins with examples and discuss the structural elucidation of Riboflavin.
3. Discuss the important reactions and structural features of glucose.
4. Discuss the chemical relationship between oestrone, oestradiol and oestriol and describe the synthesis of oestrone.
5. Classify terpenes with examples. State isoprene and special isoprene rules. How do you elucidate the structure of citral?

SECTION - B

Answer any TEN questions (10 X 4 = 40 marks)

1. What is mutarotation and write its significance?
2. Write a brief account on chemistry of cardiac glycosides?
3. How do you determine methoxyl groups in papaverine?
4. What is Isoelectric point and write its significance.
5. Write short notes on nucleic acids.
6. Give a brief account on chemistry of flavanoids.
7. How do you confirm the presence of pyrimidine in thiamine.
8. How Hoffmann exhaustive methylation is used to determine the structure of alkaloids.
9. What are vitamins. Write the structure of any three vitamins.
10. Give a synthetic scheme for conversion of diosgenin to progesterone.
11. Write short note on biological role of thyroid hormones.
12. How do you confirm the presence of keto.enol sysemin vitamin C?

IV/IV. B.PHARMACY (8th Semester)

MODEL QUESTION PAPER (Practicals)

802  PHARMACEUTICAL CHEMISTRY-V (Natural Products)

Time : 6 hours Max.Marks : 80

1. Synopsis : 10 Marks
2*. Major Experiment : 35 Marks
3. Minor Experiment : 20 Marks
4. Viva-Voce : 15 Marks

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Total: 80 Marks

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Systematic pharmacognostic studies of following categories of crude drugs

**Unit : 01**  
**Glycosides**: Aloes, Ammi, Brahmi, Buckwheat, Cantharides, Cascara, Chirata, Digitalis, Dioscorea, Gentian, Ginseg, Kalmegh, Liquorice, Psoralea, Quassia, Senna, Rhubarb, Squill, Strophantus, Wild Cherry bark.

**Unit : 02**  

**Unit : 03**  
**Volatile oils**: Bitter orange peel, Caraway, Cardamom, Cassia, Cinnamon, Citronella, Civet, Clove, Corriander, Dill, Eucalyptus, Fennel, Gaultheria, Lemonpeel, Musk, Nutmeg, Palmarosa, Peppermint, Saffron, Sandal wood, Tulsi, Vetiver.

**Unit : 04**  
Historical development of plant tissue culture: types of cultures - a study of callus culture and cell suspension. Culture, nutritional requirements, growth and their maintenance. Applications of plant tissue culture in production of pharmaceutically important secondary metabolites.

**Unit : 05**  
A study of the following Ayurvedic drugs, (Botanical source, chemical constituents, pharmacological actions and uses)

- 01. Amla (Phyllanthus emblica)
- 02. Bheda (Terminalia belerica)
- 03. Kantkari (Solanum xanthocarpum)
- 04. Malkangni (Celactrus panicula)
- 05. Tylophera (Tylophora indica)
- 06. Sataver (Asparagus recomosus)
- 07. Bhilawa (Semecarpus anacardium)
- 08. Kalijiri (Vernonia anthelmintica)
- 09. Kaner (Nerium indicum)
- 10. Punarnava (Bochraevic diffuca)
- 11. Sankhpushpi

**Unit : 06**  
**Lipids**: Bees wax, Castor oil, Cocoa butter, Cod-liver oil, Hydnocarpus oil, Kokum butter, Lard, Linseed oil, Rice bran oil, Skark liver oil and wool fat.
IV/IV. B.PHARMACY (8th Semester)

804 PHARMACOGNOSY - II (Practicals) (75 hrs.)

I*. Study of Morphology and transverse section of the crude drugs.
   a. Fennel   b. Clove   c. Coriander
   d. Nuxvomica  e. Cinnamon  f. Cinchona
   g. Dill  h. Ephedra  i. Ipecac
   j. Senna  k. Vasaka  l. Vinca

II. Identification of powdered crude drugs based on their microscopical characters.
   a. Senna   b. Vasaka   c. Ginger
   d. Cinchona  e. Cinnamon  f. Squill
   g. Rauwolfia  h. Kurchi  i. Nuxvomica
   j. Quassia

III*. Identification of powdered crude drugs (Listed in II) in their mixtures based on microscopical characters.

IV. Aseptic seed germination (Trigonella seeds)

V. Callus initiation and establishment (Catharanthus roses leaves)

VI. Morphology of crude drugs
   01. Fennel  02. Clove  03. Coriander
   04. Cardamom  05. Nuxvomica  06. Cinnamon
   07. Cinchona  08. Dill  09. Quassia
   31. Ipecac  32. Bitter Orange Peel

TEXT BOOKS:

02. Text Book of Pharmacognosy by T.E. Wallis.
03. Trease, G.E. and Evas, W.C., “Pharmacognosy” 11th and 12th editions, Bailliere Tindall, U.K.
06. Indian Material Medica by A.K. Nadkarni
07. Essentials of Pharmacognosy by Dr. S.H. Ansari.
08. Pharmacognosy and Phytochemistry by Ashutoshkar.
IV/IV. B.PHARMACY (8th Semester)
MODEL QUESTION PAPER
PHARMACOGNOSY-II (Theory)

Time : 3 hours       Max.Marks : 80

SECTION - A

Answer any four questions (4 X 10 = 40 marks)

1. Write the method of preparation, chemical constituents and uses of Aloes
2. Describe Ergot life cycle, chemistry and uses of the ergot alkaloids.
3. Write the systematic pharmacognostic study of Cinnamon
4. Write the establishment, measurement of growth and production of secondary metabolites in callus and cell suspension.
5. Give the biological source, chemical constituents and uses of amla and sataver.
6. Write the systematic pharmacognostic study of Castor oil

SECTION - B

Answer any TEN questions (10 x 4 - 40 marks)

7. Write the biological source and uses of liquorice and Cantharides.
8. Describe the chemistry of cardiac glycosides.
9. Write the chemical constituents and uses of any two crude drugs containing indole alkaloids.
10. Write the biological source and chemical test for ipecae and Colchicum
11. Give the comparative microscopy of Fennel and Coriander.
12. Write the biological source and active constituents of Ciret and Musk.
13. Enumerate nutritional requirements of plant tissue cultures.
14. Give an account on surface sterilization of an explant in plant tissue cultures.
15. Write the biological source and uses of Bhilawa and Kantakari
16. Write the chemical constituents and uses of Tylophera and Punarnava
17. Describe the physico chemical properties and identification tests for lipids
18. Write the method of preparation and uses of woolfar.

IV. B.PHARMACY (8th Semester)
MODEL QUESTION PAPER (Practicals)

804  PHARMACOGNOSY-II

Time : 6 hours       Max.Marks : 80

1. Spotting : 10 Marks
2* Major Experiment : 35 Marks
3. Minor Experiment : 20 Marks
4. Viva-Voce : 15 Marks

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Tota : 80 Marks
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IV/IV. B.PHARMACY (8th Semester)

805 GOOD MANUFACTURING PRACTICES AND VALIDATION
(Theory) (50 hrs)

Unit : 01
Concepts and Philosophy of Good Manufacturing Practice (GMP). Brief introduction of CGMP.

Unit : 02
Concepts and Philosophy of Validation. Validation methods of equipment

Unit : 03
Validation methods of water supply systems, deionised and distilled water and water for injection.

Unit : 04
Calibration of Analytical Instruments (A brief introduction). Calibration of Spectrophotometer and HPLC instrument as per ICH guidelines.

Unit : 05
Sampling Techniques. Computer applications in GMP and GLP. Statistical quality control and control charts.

Unit : 06
Concepts and Philosophy of GLP, SOP, ICH and ISO-9000.

TEXT BOOKS :
1. Good Manufacturing practice (GMP) - Mehra
2. How to practice GMP - PP Sharma
3. Quality Assurance of Pharmaceuticals (Vol-1 and 2, Pharma Book syndicate, Hyderabad)
IV/V. B.PHARMACY (8th Semester)  
MODEL QUESTION PAPER  
805 GOOD MANUFACTURING PRACTICES AND VALIDATION  
Time : 3 hours Max.Marks : 80  

SECTION-A  
Answer any four Questions (4 x 10=40)  
1. What is Good Manufacturing Practice (GMP) ? Explain in detail.  
   Add a note on CGMP.  
2. Explain the concept of Validation in Pharmacy.  
3. Write a note on Validation methods of water supply systems.  
4. What is meant by Calibration of analytical instruments ?  
   Give the detailed procedure for the calibration of Spectrophotometer.  
5. Write a note on sampling techniques.  Explain in detail about correlation and regression and Analysis of Variance (ANOVA).  
6. Write a note on any two of the following :  
   (A) GLP  (B) SOP  (C) ICH  

SECTION - B  
Answer any TEN of the following . (10 x 4 = 20 marks)  
7. Give the importance of GMP in Pharmaceutical Industry.  
8. Write a brief note on CGMP.  
9. What is Validation ?  
10. Explain in brief about validation of pharmaceutical equipment.  
11. How do validate deionised and distilled water systems.  
12. What is water for injection ? Write briefly about validation of water for injection system.  
14. Write about the Calibration HPLC instrument as per ICH guidelines.  
15. Explain precision and accuracy in detail.  Give the importance of the above in Pharmaceutical Analysis.  
16. Write a note on (a) t-test and (b) F-test  
17. Explain in detail about ISO-9000  
18. What do you mean by Standard operating procedure (SOP) ?  
   Explain in brief.