

# COURSE WISE BREAKUP

Fourth Year      Eighth Semester

SPECILIZATION

ORGANIC CHEMISTRY

## THEORY

COURSE CODE	TITLE	CREDIT HOURS	MARKS
CHEM-464	PAPER-IV: ORGANIC CHEMISTRY	03	100
CHEM-465	PAPER-V: ORGANIC CHEMISTRY	03	100
CHEM-466	PAPER-VI: ORGANIC CHEMISTRY	03	100

## PRACTICALS

COURSE CODE	TITLE	CREDIT HOURS	MARKS
CHEM-462	ORGANIC CHEMISTRY (RESEARCH PROJECT)	06	200

- Total Credits of the Semester = 15 (theory 09 & practicles 06 credits)
- Maximum Marks = 500 (theory 300 & practicles 200 marks)

## **4<sup>th</sup> Year; 8<sup>th</sup> Semester**

### **PAPER-IV**

Title of the Course: **ORGANIC CHEMISTRY**

Code: **CHEM-464**

Credit Hours: **03**

Marks: **100**

#### **Course Contents:**

##### **Mechanisms and Methods of Determining Them**

Review of kinds and mechanism of organic reactions; thermodynamic and kinetic requirements for reactions: kinetic and thermodynamic control; The Hammond postulate; microscopic reversibility; methods of determining mechanisms; identification of products; determination of the presence of an intermediate; the study of catalysis; crossover experiments; isotopic labeling; stereochemical and kinetic studies; solvent effect.

##### **Lipids, Proteins, Carbohydrates and Nucleic Acids**

Chemistry of lipids, proteins, carbohydrates, nucleic acids and their importance in living systems.

##### **Drugs-Pharmaceutical Compounds**

Introduction; classification; chemistry of analgesics and antipyretics, sulpha drugs/sulphonamides, antimalarials and antibiotics.

#### **RECOMMENDED BOOKS:**

1. Carroll, F. A., "Perspectives on Structure and Mechanism in Organic Chemistry", Brooks/Cole Publishing Company, New York.
2. Jones, R. A. Y., "Physical and Mechanistic Organic Chemistry", Cambridge University Press, Cambridge.
3. Carey, F. A. and Sundberg, R. J., "Advanced Organic Chemistry Part B: Reactions and Synthesis", Plenum Press, New York.
4. March, J., "Advanced Organic Chemistry", John Wiley & Sons, New York.
5. Gould, E. S., "Mechanism and Structure in Organic Chemistry", Holt, Rinehart and Winston, New York.
6. Clayden, J., Greeves, N., Warren, S. and Wothers, P., "Organic Chemistry", Oxford University Press, New York.
7. Loudon, G. M., "Organic Chemistry", Oxford University Press, New York.

8. Brown, W. H., "Introduction to Organic Chemistry", Saunders College Publishing, Tokyo.
9. Ahluwalia, V. K. and Goyal, M., "A Text Book of Organic Chemistry", Narosa Publishing House, New Delhi.
10. Finar, I. L., "Organic Chemistry", Vol. 2, Pearson Education, Delhi.
11. Blei, I. and Odian, G., "General, Organic and Biochemistry", W.H. Freeman & Company, New York.
12. Solomons, T. W. G. and Fryhle, C. B., "Organic Chemistry", John Wiley & Sons, New York.
13. Burger, A., "Medicinal Chemistry Part I & II", John Wiley & Sons, New York.
14. Wolff, M. E., "Burger's Medicinal Chemistry Part II", John Wiley & Sons, New York.
15. Williams, D. A. and Lemke, T. L., "Foye's Principles of Medicinal Chemistry", Lippincott Williams & Wilkins, New York.
16. Sykes, P., "A Guide Book to Mechanism in Organic Chemistry", Longman, London.
17. Pine, S. H., "Organic Chemistry", National Book Foundation, Islamabad.
18. Norman, R. O. C. and Coxon, J. M., "Principles of Organic Synthesis", Nelson Thornes, Cheltenham.
19. Isaacs, N. S., "Physical Organic Chemistry", Longman, London.

#### **4<sup>th</sup> Year; 8<sup>th</sup> Semester**

#### **PAPER-V**

Title of the Course: **ORGANIC CHEMISTRY**

Code: **CHEM-465**

Credit Hours: **03**

Marks: **100**

#### **Course Contents:**

##### **Alkaloids**

Introduction; classification; isolation; general methods for structure elucidation; discussion with particular reference to structure and synthesis of ephedrine, nicotine atropine, quinine, papaverine and morphine.

## **Terpenoids**

Introduction; classification; isolation; general methods for structure elucidation; discussion with particular reference to structure and synthesis of citral,  $\alpha$ -terpineol,  $\alpha$ -pinene, camphor and  $\alpha$ -cadinene.

## **Steroids**

Introduction; nomenclature and stereochemistry of steroids; structure determination of cholesterol and bile acids; introduction to steroidal hormones with particular reference to adrenal cortical hormones.

### **RECOMMENDED BOOKS:**

1. Finar, I. L., "Organic Chemistry", Vol. 2, Pearson Education Ltd., Delhi.
2. Shoppee, C. W., "Chemistry of the Steroids", Butterworths, London.
3. Hesse, M., "Alkaloid Chemistry", John Wiley & Sons, New York.
4. Fieser, L. F. and Fieser, M., "Steroids", Asia Publishing House, London.
5. Morrison, R. T. and Boyd, R. N., "Organic Chemistry", Prentice-Hall of India, New Delhi.
6. Solomons, T. W. G. and Fryhle, C. B., "Organic Chemistry", John Wiley & Sons, New York.

## **4<sup>th</sup> Year; 8<sup>th</sup> Semester**

### **PAPER-VI**

Title of the Course: **ORGANIC CHEMISTRY**

Code: **CHEM-466**

Credit Hours: **03**

Marks: **100**

### **Course Contents:**

#### **Transition Metal Catalyzed Coupling Reactions**

Transition metals and their complexes; oxidation states; the *dn* notations; electron counting: the 16- and 18- electron rules; fundamental reactions of transition metal complexes; the Heck reaction and other examples of transition metal catalyzed reactions.

## **Reterosynthesis**

Introduction to reterosynthesis and disconnection approach; synthesis of aromatic compounds with one and two group carbon C-X disconnections; donor and acceptor synthons; C-C disconnections and 1,2-, 1,3-, 1,4-, 1,5- and 1,6- difunctionalized compounds.

## **Synthetic Polymers**

Introduction to polymer chemistry; step growth polymerization; free radical polymerization; ionic polymerization; stereochemistry in polymers; polymerization using Ziegler-Natta catalyst; stereo-regulation and conformation polymers; molecular weight determination of polymers; structure-property relationship; reactions of synthetic polymers; degradation and stability with special emphasis on thermal and photodegradation.

## **RECOMMENDED BOOKS:**

1. Bruckner, R., "Advanced Organic Chemistry-Reaction Mechanisms", Harcourt Science & Technology Company, New York.
2. Loudon, G. M., "Organic Chemistry", Oxford University Press, New York.
3. Powell, P., "Principles of Organometallic Chemistry", Chapman & Hall, New York.
4. Parkins, A. W. and Poller, R. C., "An Introduction to Organometallic Chemistry", Macmillan, London.
5. Waren, S., "Organic Synthesis-The Disconnection Approach", John Wiley & Sons, New York.
6. Waren, S., "Workbook for Organic Synthesis-The Disconnection Approach", John Wiley & Sons, New York.
7. Smith, M. B., "Organic Synthesis", McGraw-Hill, New York.
8. Clayden, J., Greeves, N., Warren, S. and Wothers, P., "Organic Chemistry", Oxford University Press, New York.
9. Parker, D. B. V., "Polymer Chemistry", Applied Science Publishers, London.
10. Billmeyer Jr., F. W., "Textbook of Polymer Science", John Wiley & Sons, New York.
11. Challa, G., "Polymer Chemistry—An Introduction", Ellis Horwood, New York.
12. Stevens, M. P., "Polymer Chemistry—An Introduction", Addison-Wesley Publishing Company, London.
13. Wade Jr., L. J., "Organic Chemistry", Pearson Education, Delhi.

14. Morrison, R. T. and Boyd, R. N., "Organic Chemistry", Prentice-Hall of India, New Delhi.

**4<sup>th</sup> Year; 8<sup>th</sup> Semester**

Title of the Practicals: **ORGANIC CHEMISTRY (RESEARCH PROJECT)**

Code: **CHEM-462**

Credit Hours: **06**

Marks: **200**

**RECOMMENDED BOOKS:**

1. Clarke, H. T., "A Handbook of Organic Analysis-Qualitative and Quantitative", CBS Publishers & Distributors , New Delhi.
2. Mann, F. G. and Saunders, B. C., "Practical Organic Chemistry", Longman, London.
3. Vogel, A. I., "Elementary Practical Organic Chemistry Part 3: Quantitative Organic Analysis", Longman, London.
4. Vishnoi, N. K., "Advanced Practical Organic Chemistry", Vikas Publishing House Pvt. Ltd., New Delhi.
5. Furniss, B. S., Hannaford, A. J., Smith, P. W. G. and Tatchell, A.R., "Vogel's Text Book of Practical Organic Chemistry", National Book Foundation, Islamabad.
6. Shriner, R. L., Hermann, C. K. F., Morrill, T. C., Curtin, D. Y. and Fuson, R. C., "The Systematic Identification of Organic Compounds", John Wiley & Sons, New York.
7. Mendham, J., Denney, R. C., Barnes, J. D. and Thomas, M. J. K., "Vogel's Text Book of Quantitative Chemical Analysis", Pearson Education, New Delhi.
8. Beckett, A. H. and Stenlake, J. B., "Practical Pharmaceutical Chemistry", Athlone Press, London.
9. Pavia, D. L., Lampman, G. M. and Kriz, G. S. "Introduction to Spectroscopy: A Guide for Students of Organic Chemistry", Saunders Golden Sunburst Series, London.
10. Silverstein, R. N., Barrler, G. C. and Morrill, T. C., "Spectrometric Identification of Organic Compounds", John Wiley & Sons, New York.
11. Kalsi, P.S. "Spectroscopy of Organic Compounds", Wiley Eastern Ltd., New Delhi.
12. Palleros, D. R., "Experimental Organic Chemistry", John Wiley & Sons, New York.

13. Keese, R, Muller, R. K. and Toube, T. P., "Fundamentals of Preparative Organic Chemistry", John Wiley & Sons, New York.
14. Gurtu, J. N. and Kapoor, R., "Advanced Experimental Chemistry", S. Chand & Company Ltd., New Delhi.
15. Newman, M. S., "An Advanced Organic Laboratory Course", Macmillan, New York.
16. Zubrick, J. W., "The Organic Chem Lab Survival Manual: A Student's Guide to Techniques", John Wiley & Sons, New York.
17. Kemp, W., "Organic Spectroscopy", Palgrave, New York.
18. Lambert, J. B, Shurvell, H. F., Lightner, D. A. and Cooks, R. G., "Introduction to Organic Spectroscopy", Macmillan Publishing Company, New York.
19. Williams D. H. and Fleming, I., "Spectroscopic Methods in Organic Chemistry", Athlone Press, London.
20. Atta-ur-Rehman, "Nuclear Magnetic Resonance Spectroscopy", UGC, Islamabad.
21. Davis, R. and Freason, M., "Mass Spectrometry", John Wiley & Sons, New York.