

## Tentative Syllabus of NIPER-JEE

Dear friends,

To live with success is to have healthier intellect. NIPER is one of the targets to achieve success. We are sure you all have a very good perception of the importance of NIPER. We have not seen many institutes but of the much we have seen and the much we have heard, As per Pharmacophore Solutions ([www.gpatindia.com](http://www.gpatindia.com)) NIPER is amongst the best. We are sure most of you would be aspiring of being in NIPER. And those who are sure of their capability and competence should prove their metal here. Those who are determined find their way at their own but if footprints are there, probability of success is higher. So this is the small attempt to help those aspiring for a career in pharmaceutical research in NIPER.

We have compiled sets of certain points for each subject. These are just grids for the study and are helpful for the specialization papers. **You need not to be thorough of it but if not thoroughly, at least you should be aware of it.** None of it should be something heard first. By the way most of these are covered in B. Pharm syllabus.

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### **Appeal:**

**Please memorize NIPER-JEE questions 2011 and mail us at [info@gpatindia.com](mailto:info@gpatindia.com). It will be your great help to Pharmacy professions. You can see that if this thing was happened before, you have old NIPER papers. So please send us the questions we will compile all these questions with their answers and calculate the cut off.**

### **Entrance pattern:**

Entrance consists of 200 questions in 2 hours. (Please check it in Brochure).

Questions will be very easy so no need to go in depth of the topic. **Basic concepts based questions are asked.**

### **What to study?**

#### **A. Medicinal, Organic, and Physical Chemistry**

1. IUPAC nomenclature, **R and S nomenclature, E and Z isomerism**, isomerism, Conformations, **Epimers, Anomers** etc. **Do not forget to read 3-4 chapters from**

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**Morrison & Boyd 1-2 chap. on stereochemistry and 1-2 chaps. on carbohydrate and protein chemistry.**

2. Hybridization, aromaticity, Huckles rule reaction mechanisms- Electrophilic, Nucleophilic,  $SN_1$ ,  $SN_2$   $SN_i$ , Elimination  $E_1$   $E_2$  etc.
3. Ester hydrolysis,  $Aac1$   $Aac2$ .....all eight mechanisms(Jerry march) Markovnikovs rule, Bredts rule, Stereoselectivity, stereospecificity, regioselectivity, chemoselectivity, chirality, stereochemistry, conformations, rearrangements, acids and bases.
4. Imine-enamine Tautomerism, Keto-enol Tautomerism, Pericyclic reactions, Racemic mixture, resolution methods.
5. Introduction to thermal methods of analysis like, **TGA, DSC DTA** etc.
6. Various Heterocycles, Heterocycle synthesis, reactions
7. Introduction to Redox reactions
- 8 Basic tests for amines, ketones, aldehydes eg. Hinsebergs test, Iodoform test etc.
9. Reaction kinetics, first second third and pseudo first order reactions, radiolabelling for determination of mechanism.
10. Common condensation reactions like aldol, claisen perkin , dickmenn, darzen etc.
11. Other reactions like cannizarros reaction, knovenagel reaction, especially reactions of carbonyl compounds (Named reactions).

**References:**

1. Jerry March
2. Morrison and Boyd
3. I. L. Finar Vol-I and Vol-II
4. Eliel

### **B. Pharmaceutical Analysis**

1. **Spectroscopy**: (basics specially): **VVIMP** topic.
2. NMR, and **C-NMR** ranges from Morrison & Boyd or **Pavia**
3. Mass, Basic concepts about various peaks  $M+1$ , molecular ion, base peak etc.(Silverstein)
4. IR, Frequencies of various groups specially **carbonyls**- Ref. **Pavia**
5. UV woodaward – fischer rules and calculations, Chromatography: detailed.

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6. Stability testing of pharmaceuticals, various stability tests, kinetic studies, shelf life determination, thermal stability, formulation stability.
7. Various analytical techniques
8. Tests: physical and chemical tests, limit tests, microbiological tests, biological tests, disintegration and dissolution tests. Revise it once
9. Particle sizing: law of diffraction.
10. Electrophoresis: capillary electrophoresis.
11. QA and QC: GLP, TQM, ISO system.
12. Preformulation, cyclodextrin inclusion compounds
13. Solubility: pH, pka, surfactant HLB values, Rheology.
14. Crystallinity, polymorphism, solvates and hydrates, crystal habits, porosity, surface area flow properties.
15. Dosage forms, Stages of dosage form development
16. Osmolality, osmolarity, osmotic pressure, conductivity, Preservatives, Media for bioassay.

### *References:*

1. Willard
2. Silverstein
3. Kemp
4. Pavia
5. Others like Alfred Martin, Chatwal, Garry Christen

### **C. Natural Products:**

In natural products more stress should be given on phytochemistry part rather than biological aspects.

1. Methods of extraction, isolation and characterization of natural products. Various separation techniques used for isolation of natural products.
2. Amino acids proteins, various methods for amino acid detection, Ninhydrin test, peptide sequencing, structures of amino acids, essential and nonessential amino acids,
3. Carbohydrates classification, osazone test, **mutarotation**, etc.
4. **Biosynthetic pathways**.esp. Which alkaloids are derived from which amino acid?

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5. Primary metabolites, their examples.
6. Secondary metabolites, various classes of secondary metabolites (eg. Alkaloids, glycosides, tannins, lignans, saponins, lipids, flavonoids, coumarins, anthocyanidins etc.). Here most imp. part is **chemistry of these classes**. Eg. gamma pyrano 4-..... is called as ..... like questions.
7. Important therapeutic classes: antidiabetics, hepatoprotectives, immunomodulators, nutraceuticals, natural products for gynecological disorders, anti-cancer, anti-viral (mainly anti-HIV), adaptogens etc.
8. Dietary antioxidants, Marine natural products, Plant growth regulators.
9. Biological sources of important classes of natural products. (Selected ones only) eg. Guggul, Karela, reserpine, jalap, neem etc.
10. Standardization of natural products.
11. What is difference between natural products and pharmacognosy?

### **References:**

1. For various therapeutic classes: Trease and Evans
2. For biosynthesis: Brady and Tyler.

### **D. Pharmacology and toxicology:**

1. Pharmacokinetics, pharmacodynamics, pharmacological effect, desired, undesired, toxic, adverse effects.
2. Bioavailability, bioequivalence, various factors of ADME. (From **Bramhankar**) **IMP**
3. Drug metabolism: various pathways and other details.
4. Drug interactions, agonist, antagonist, partial agonist, protein binding, drug distribution, distribution volume, excretion pathways etc.
5. Pharmacological screening: general principles, various screening models, screening methodologies (in vitro and in vivo tests).
6. Mechanism of drug action, drug-receptor interaction
7. Various adrenergic, cholinergic and other receptors
8. Detailed study of CNS pharmacology
9. Study of basis of threshold areas of work in NIPER in pharmacology dept. mentioned in **brochure**.

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10. Diseases: study of the pharmacology of the diseases and drugs used with mode of action especially of diabetes, malaria, leishmaniasis, TB, hypertension, myocardial ischemia, inflammation, and immunomodulation.
11. Chemotherapy and Pathophysiology- knowledge of antibiotics, their mode of action and the microorganisms responsible for various common diseases.
12. Bioassay methods, various requirements. **Brief knowledge of the statistical tests.**

### *References:*

1. K.D.T.
2. Rang and Dale
3. Wilson and Griswold (for Mechanism)

### **E. Pharmaceutics and formulation (Pharm. tech.)**

1. Drug delivery systems (DDS): NDDS models, osmotic pumps, various release patterns eg. Controlled release, delayed release. Sustained release etc., order of release. Oral controlled DDS, factors affecting controlled release. **Read NDDS chapter in RPS**
2. Carriers in DDS: polymers and their classification, types, carbohydrates, surfactants, proteins, lipids, prodrugs etc.
3. Transdermal drug delivery systems (TDDS): principles, absorption enhancers, evaluation of TDDS.
4. Parenterals: requirements, advantages, disadvantages, release pattern, route of drug delivery.
5. Drug targeting: microspheres, nano particles, liposomes, monoclonal antibodies, etc.
6. Preformulation detailed (**size ranges** of these compounds are asked).
7. Complexation, solubilization, polymerization, viscosity measurements.
8. Dosage form development- stages, implications of dosage form.
9. Additives of formulation, types, examples, advantages, disadvantages, drug excipient interaction, incompatibility, various types of incompatibilities.

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10. Dosage forms: solid (tablets, capsules, pills etc), liquid (emulsion, suspension etc), sterile (injectables), aerosols. Principles, advantages, disadvantages and problems.
11. Coating - in detail.
12. Packaging: materials, labeling etc. Types of containers (eg. Tamper-proof containers)
13. In process controls, Product specification, documentation.
14. Compartmental modeling. (From Bramhankar)
15. Bioavailability, bioequivalence studies. Methods of improvement of oral bioavailability.
16. Evaluation of formulation, principles and methods of release control in oral formulations.
17. **New Drug application process** with concepts of NDA, INDA etc. from Ansel

### *References:*

1. Remington's Pharmaceutical Sciences
2. Others: Bramhankar, Lachmann, Alfred Martin, Liberman Series

## **F. Biotechnology**

1. Genetic Engg: Gene expression, mutation, replication, transcription, translation, recombination, bacteriophages.
2. Cloning: methods, isolation of nucleic acids, enzymes in cloning (restriction endonucleases, DNA ligase, DNA gyrase, polymerases etc..), functions of these enzymes, Pallindromes.
3. Fermentation: fermenters, fermentation process, its regulation, conditions, bioprocessors, various enzymes in fermentation technology. Fermentation of Antibiotics, vitamins, amino acids, hydroxy acids such as lactic acid etc.
4. Gene therapy: methods and applications.
5. Monoclonal antibodies, insulin, interferons, enkephylins, angiotensin analogues and other peptides. Read about **HAT medium** its ingredients and role of each ingredient.

## **G. Biochemistry**

1. Carbohydrate, Protein, Lipid metabolism and pathological diseases due to deficiency and excessive accumulation.
2. Vitamins
3. Liver function test, Kidney Function Tests.

### *References*

1. Harper, Lahninger, stryker, UV satyanarayan

### **H. General Aptitude**

1. Current affairs, English (Synonym and Antonym), Reasoning, Maths
2. Info about India research institute-like where they situated, when they started etc.
3. concepts of mean, mode, median and effect of increase and decrease of sample size on these parameters. Co-effi. of variation etc.
4. Drug and Cosmetic act, Pharmacy Act & Patent act
5. USFDA approvals, ANDA, INDA, NDA, ICH

We repeat again **no need to know everything very thoroughly but go through each with bit and piece at least once.**

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Think that you are destined to be in NIPER and rest assured you will be part of it.

**Good Luck**

**From**

**Team Pharmacophore Solutions**

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