SYLLABUS

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 and we are proud of being here in NIPER. We have not Seen many institutes but of the much we have seen and the much we have heard, **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 their, probability of success are 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. Pharmacy syllabus. For the general paper, our experience is that one should **revise the GPAT preparation**. Most of the questions in general paper are quite easy. But be sure you are well prepared for it since this is the screening paper.

National Institute of Pharmaceutical Education and Research (NIPER) has been created as a center of excellence for higher training, research and development in pharmaceutical sciences and technology and its first institute of this kind in the country. The institute has been declared as an institute of national importance by Government of India and established by an act of Parliament.

For general information go to niper's web site
www.niper.nic.in
www.niper.gov.in

The institute offers the students various courses viz. M. Pharm, M. Tech. (Pharm), M.S (Pharm.) and Ph.D. Programmes in various departments every year.

First bring good rank in entrance
Specialization branch you can select at time of counseling.
At present there are total eleven departments in this institute.

1. Medicinal chemistry
2. Natural products
3. Pharmacology and toxicology
4. Pharmaceutics
5. Pharmaceutical analysis
6. Pharmaceutical technology (Bulk drugs) (chemistry)
7. Pharmaceutical technology (Formulation) (Pharmaceutics)
8. Pharmaceutical technology Biotechnology (PTBT)
9. Biotechnology
10. Practice of pharmacy.
11. Pharmacoinformatics
12. M. B. A. (Pharm)
13. M. Pharm. in Clinical Research.
14. M. S. (Pharm.) Toxicology.

Well, entrance consists of **200 questions in 2 hours**. (Please check it in Brochure). Well questions will be very easy so no need to go in depth of the topic. Basic concepts based questions are asked. M. Pharma branches and M.B.A. has a common entrance paper. So read some **General knowledge** aspects also.

This syllabus is just like **GATE** entrance but more specific in Basic Chemistry instead of *medicinal chemistry*.
Specialization subjects: What to study?

Organic chemistry and Bulk Drugs (Pharmaceutical Technology)

1. IUPAC nomenclature, R and S nomenclature, E and Z isomerism, atropiisomerism, Conformations laws.

2. Hybridization, aromaticity, Huckel's rule reaction mechanisms- Electrophilic, Nucleophilic, SN1, SN2, SNi, Elimination E1, E2 etc

3. Ester hydrolysis, Aac1 Aac2..all eight mechanisms (Jerry march) Markovnikoves rule with examples, 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. Amino acids, proteins, various methods for amino acid detection, Ninhydrin test, peptide sequencing, structures of amino acids, essential and nonessential amino acids.

6. Introduction to thermal methods of analysis like, TGA, DSC, DTA etc.

7. Carbohydrates, osazone test, mutarotation, etc.

8. Various Heterocycles, Heterocycle synthesis, reactions.

9. Introduction to Redox reactions.

10. Spectroscopy: (basics specially): Very very IMP topic. NMR, and C-NMR ranges from Morrison & Boyd or Pavia Mass -Basic concepts about various peaks M+1, molecular ion, base peak etc. (Silverstein) IR - Frequencies of various groups specially carbonyls. UV.

11. Chromatography: Details of every chromatographic method.

12. Reaction kinetics, first second third and pseudo first order reactions, radio labeling for determination of mechanism.

13. Common condensation reactions like Aldol, Claisen, Perkin, Dickmann, Darzen etc.

14. Other reactions like Cannizarro's reaction, Prins reaction, especially reactions of carbonyl compounds.

15. Oxidizing & reducing agents like sodium borohydride, chromic acid & their use in named reactions

16. Stereochemistry chiefly very very very important.

17. UV ranges, IR delta values, NMR peaks, Numericals

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. Biosynthetic pathways.

3. Primary metabolites, their examples.

4. Secondary metabolites, various classes of secondary metabolites (e.g. Alkaloids, glycosides, tannins, lignans, saponins, lipids, flavonoids, coumarins, anthocyanidines etc.). Here most imp. Part is chemistry of these classes.

5. Important therapeutic classes: antidiabetics, hepatoprotectives, immmunomodulators, neutraceuticals, natural products for gynecological disorders, anti-cancer, anti-viral (mainly anti-HIV), adaptogens etc.

6. Dietary antioxidants, Marine natural products, Plant growth regulators.

7. Spectroscopy: Basic concepts of UV, NMR, IR and Mass spectroscopy. Give more stress on IR and NMR.

8. Stereochemistry: Basic concepts.

9. Fischer, sawhorse and newmon projection formulaes.

10. Biological sources of important classes of natural products. (Selected ones only)

11. Standardization of natural products.

12. What is difference between natural products and pharmacognosy?
13. Natural products as anti viral & anti cancer agents with examples.

Pharmacology and toxicology

1.Pharmacokinetics, pharmacodynamics, pharmacological effect, desired, undesired, toxic, adverse effects.

2. Bioavailability, bioequivalence, various factors of ADME. (From Bramhankar)

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.

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 immunomodualtion.

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.

13. Basic mechanism of all drugs with major side effects & classification.

14. Receptors classification with examples.

Pharmaceutics and formulation (Pharmaceutical Technology)

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.

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.

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.

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 (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.

Pharmaceutical analysis

1. Stability testing of pharmaceuticals, various stability tests, kinetic studies, shelf life determination, thermal stability, formulation stability.

2. Various analytical techniques

3. Tests: physical and chemical tests, limit tests, microbiological tests, biological tests, disintegration and dissolution tests.

4. Spectroscopic methods; UV, NMR, IR, MS, GCMS, FT-IR, FT-NMR, ATR (Attenuated Total Reflectance), FT-Raman- basics and applications.

5. Thermal techniques: DSC, DTA, TGA, etc.

6. Particle sizing: law of diffraction.

7. Electrophoresis: capillary electrophoresis.

8. Chromatography- detailed.

9. QA and QC: GLP, TQM, ISO system.

10. Preformulation, cyclodextrin inclusion compounds

11. Solubility: pH, pka, surfactant HLB values, Rheology.

12. Crystallinity, polymorphism, solvates and hydrates, crystal habits, porosity, surface area flow properties.

13. Dosage forms, Stages of dosage form development

14. Osmolality, osmolarity, osmotic pressure, conductivity, Preservatives, Media for bioassay.

Pharmaceutical Biotechnology

1. Protein: Structure, Allosteric proteins, Amino acid analysis & Protein sequencing (Sanger's, etc from **zubey**), peptide synthesis. (**Lehninger**)

2. Enzyme: Active site, Functional groups, Enz-Sub complex, Co-factors, Michaelis-menten eq^{n} , Enzyme inhibition, Isoenzymes, Allosterism, Mechanism of action of some selected enzyme (Chymotrypsin, Trypsin). (Read from **Zubey**)

3. DNA replication, Transcription and Translation

4. Recombinant DNA technology: Bacterial transformation, transduction, etc. PCR, Southern, Northern blotting, Plasmid-Vector concept. (Read **Microbiology-Tortora** chapter on r-DNA technology).

5. Immunology: Concepts of Innate/ Adaptive/ immunity, epitope. Hypersensitivity reactions. ELISA, Immunofluorescence tests.

6. Microorganism for amino acids, baker's yeast, ethanol, aceton-butanol, citric acid, lactic acid. Also, antibiotics and vitamin producing organism.

Practice of Pharmacy

The best part for the preparation for this best reference for this would be Remington's Pharmaceutical Sciences. This branch is quite new here, so till dates students of branch used to do case study of prescriptions in Fortis hospital, PGI Chandigarh and govt. college chd. This is much like pharmacology and drug-drug interactions and different interactions are emphasized. Diabetes, heart diseases are main area of study.

Pharmacoinformatics

Terminologies related with new emerging informatics e.g. proteomics, genomics, QSAR (2D, 3D, regression, correlation).

References:
Foye, Williams and Lemke, Medicinal chemistry, 5th/6th edition, chapter 1-6.
(Computational drug design and molecular modeling).

Others (MOST IMPORTANT & SCORING)

Statistics, general mathematics and aptitude questions. Use MBA entrance test books like CET or CAT in MBA. Additionally some **General awareness questions (synonyms)-10-15 questions**

Latest drugs banned & approved in US market, read latest journals, internet for this-5-6 questions

Ramchandran plot & Bredt & Markonikov rule with examples-3 questions

Complete basics of organic chemistry.

Advancement in analytical chemistry.

NIPER's Thrust areas are

Microbial and viral diseases: Yeast, and fungi.
Parasitic and tropical diseases: Malaria, Leishmaniasis, amoebiasis, cancer, aids etc.
Metabolic Disorders: Diabetes Strokes
Oxidizing, reducing agents & Stereochemistry
Organic reactions & mechanisms
Peptide and carbohydrate chemistry.
Genomics and proteomics: yeast and fungi
Hormonal disorders: Sex & TSH related diseases.

ENTRANCE PATTERN

You have answer 200 questions in 120min.

But remember its not tough job you can attempt all questions. Only don't waste time on tough question more than 45sec. Most of the questions will take 5sec. to attempt. Try to manage time and success is yours.

Well I repeat again **no need to know everything very thoroughly but go through each bit and piece at least once. Basic conceptual and logical questions are there don't go in more depth.**

Lastly, remember

Men often believe what they believe themselves to be.
If I believe I can not do something, it makes me incapable of doing it.
But when I believe I can, and then I acquire the ability to do it even if I didn't have it in the beginning.

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

ALL THE BEST

Regards
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Appeal

Please memorize NIPER-JEE questions 2015 and mail us at admin@gdc4gpat.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.