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# MANIPAL UNIVERSITY

## FIRST YEAR M. PHARM. DEGREE EXAMINATION – MAY 2015

### SUBJECT: MEDICINAL CHEMISTRY – I (PCH 601T)

**(SPECIALIZATION: PHARMACEUTICAL CHEMISTRY)**

**(2014 REGULATION)**

Monday, May 18, 2015

Time: 10:00 – 13:00 Hrs. Max. Marks: 100

✍ **Answer ALL questions.**

1. Discuss in detail the phases of drug metabolism

(10 marks)

2. Explain the advantages and disadvantages of carrier mediated prodrugs. Discuss about Selective optimization of side effects

(10 marks)

3. Write in detail about drug-receptor interactions.

(10 marks)

4. Discuss enzymes and membrane transporters as drug targets

(10 marks)

5. Explain the various stages of drug discovery.

(10 marks)

6. Write about structural modification and their effect on pharmacokinetics of drugs. Add a note on stereochemistry and its effect on pharmacokinetic properties.

(10 marks)

7. With suitable example explain the relationship between functional groups and molecular properties

(10 marks)

8. Explain with suitable example the binding role of amines, aromatic ring and quaternary ammonium salts

(10 marks)

9. **Write short notes:**

9A. Fragment based drug discovery

9B. X-ray crystallography screening techniques

(5 marks × 2 = 10 marks)

10. **Write briefly on the following**

10A. Macro marines as useful source of drugs

10B. Lead identification and optimization

(5 marks × 2 = 10 marks)

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# MANIPAL UNIVERSITY

## FIRST YEAR M. PHARM. DEGREE EXAMINATION – MAY 2015

### SUBJECT: MEDICINAL CHEMISTRY – II (PCH 602T)

**(SPECIALIZATION: PHARMACEUTICAL CHEMISTRY)**

**(2014 REGULATION)**

Wednesday, May 20, 2015

Time: 10:00 – 13:00 Hrs. Max. Marks: 100

**Answer ALL questions.**

1. Discuss the various resins used in combinatorial chemistry. List out the advantages of combinatorial chemistry over wet synthetic approaches

(10 marks)

2. How is recombinant DNA technology widely exploited in new drug discovery? Explain with suitable examples.

(10 marks)

3. Discuss typological characterization of biomarkers and their applications.

(10 marks)

4. What are the benefits of patent protection? Write a note on patentable and non-patentable inventions

(10 marks)

5. Explain the steps involved in the solution phase synthesis of a peptide and mention its applications on synthetic peptides

(10 marks)

6. Explain the potential problems of CoMFA and 3D pharmacophore identification

(10 marks)

7. Discuss the importance of log P determination and protein binding studies and explain any one method to evaluate the log P of a new chemical entity

(10 marks)

8A. A new molecule, PDC [10mg/kg] has been evaluated for its effects on the blood glucose levels in albino rats of Wistar strain. The control group received saline as the vehicle [0.1ml/100g]. After ten days of treatment, the blood glucose readings (mg/dl) in the groups of diabetic rats were as follows

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| control, | 300 | 400 | 350 | 450 | 380 | 380 | 410 | 360 | 350 | 315 |
| PDC, | 205 | 250 | 268 | 275 | 200 | 197 | 100 | 198 | 280 | ---- |

Use a suitable statistical test to analyze the effect of PDC on the glucose levels. Is it more efficacious than the control? Justify your answer

8B. Brief upon the null and alternative hypothesis. Explain the type I and type II errors.

(6+4 = 10 marks)

9. **Write Short Notes**

9A. Structural modification strategies used in safety studies.

9B. Nephalometric kinetic solubility analysis for a new chemical entity.

(5 marks × 2 = 10 marks)

10. **Write briefly on the following**

10A. Variability of observations with examples.

10B. The descriptors used In QSAR.

(5 marks × 2 = 10 marks)

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# MANIPAL UNIVERSITY

## FIRST YEAR M. PHARM. DEGREE EXAMINATION – MAY 2015

### SUBJECT: PHARMACEUTICAL PROCESS CHEMISTRY (PCH 603T)

(SPECIALIZATION: PHARMACEUTICAL CHEMISTRY)

(2014 REGULATION)

Friday, May 22, 2015

Time: 10:00 – 13:00 Hrs. Max. Marks: 100

**Answer ALL questions.**

1. Discuss the use of insoluble solid supports for modifying and controlling the reagent reactivity with suitable examples.

(10 marks)

2. Write the methods used for the protection and deprotection of alcohols as esters and carbonates.

(10 marks)

3. Discuss the various process design reasons for selection of a solvent in a chemical process with suitable examples.

(10 marks)

4. **Explain the following:**

4A. Phase transfer catalysis

4B. Solvation and reactivity

(10 marks)

5. **Discuss on the following:**

5A. Simplification of reaction work-up

5B. Reaction runaway scenarios

(10 marks)

6. Mention the importance of polymorphism in pharmaceuticals and how it is evaluated.

(10 marks)

7. Explain the basic concepts in salt formation and the biological effects of salt forms.

(10 marks)

8. Explain the following reactions involving enzymes hydrolysis of:

a) Amides b) Esters c) Epoxides d) Nitriles

(10 marks)

9. **Write short notes on:**

9A. Physicochemical properties of ionic liquids

9B. Crystallization by the addition of antisolvent

(5 marks × 2 = 10 marks)

10. **Write briefly on the following:**

10A. Reactive crystallization technique

10B. Crystallization by concentration of solvent

(5 marks × 2 = 10 marks)

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# MANIPAL UNIVERSITY

## FIRST YEAR M. PHARM. DEGREE EXAMINATION – MAY 2015

### SUBJECT: ADVANCED ORGANIC CHEMISTRY (PCH 604T)
### (SPECIALIZATION: PHARMACEUTICAL CHEMISTRY)
### (2014 REGULATION)

Monday, May 25, 2015

Time: 10:00 – 13:00 Hrs. Max. Marks: 100

✍ **Answer ALL questions:**

1. Discuss the retrosynthetic analysis and forward synthesis of Carbamazepine. (10 marks)

2. Explain the methods of synthesis and chemical reactions of Pyridine. (10 marks)

3. Write the names and structures of benzanellated azoles giving a method of preparation of one of them. Mention the importance of tautomerism in heterocyclics. (10 marks)

4. Expand the abbreviations of DCC, TBAB, HOBT and LAH with their structures. Write the applications of any two of them. (10 marks)

5. With suitable examples, explain the mechanisms involved in Vilsmier-Haack reaction and Wittig rearrangement. (10 marks)

6. Explain substrate controlled aldol reaction with an example. (10 marks)

7. Discuss chelation enforced chirality transfer and enantio selective dihydroxilation of alkenes. (10 marks)

8. What are retro Diels-alder reaction and asymmetric transfer hydrogenation? (10 marks)

9. **Write short notes on:**

9A. Jones oxidation

9B. Mitsunobu reaction

(5 marks × 2 = 10 marks)

10. **Write briefly on the following:**

10A. Benzopyrones

10B. Thermodynamic resolution

(5 marks × 2 = 10 marks)

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# MANIPAL UNIVERSITY

## FIRST YEAR M. PHARM. DEGREE EXAMINATION – MAY 2015

### SUBJECT: SPECTRAL AND CHROMATOGRAPHIC TECHNIQUES (PCH 605T)

**(SPECIALIZATION: PHARMACEUTICAL CHEMISTRY & PHARMACOGNOSY)**

**(2014 REGULATION)**

Wednesday, May 27, 2015

Time: 10:00 – 13:00 Hrs. Max. Marks: 100

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1. List out the differences between
   i) APT and DEPT ii) $^{13}C$ NMR and $^{1}H$ NMR iii) HMBC and HMQC

(10 marks)

2A. What are the factors effecting the chemical shift values in a $^{13}C$ spectra?

2B. Assign $^{1}H$ NMR chemical shift values to the different hydrogens in the following compounds and draw the spectra:
   i) Anisole ii) Cinnamaldehyde iii) Acetanilide iv) Diethylamine

(5+5 = 10 marks)

3. Explain the principle, methodology and application involved in capillary electrophoresis.

(10 marks)

4A. Write a brief account of the following:
   i) Spin-spin coupling ii) NOE with an example

4B. Discuss in detail about MALDI technique.

(5+5 = 10 marks)

5. Discuss in detail about factors affecting ion abundance and list out the applications of mass spectrometric technique.

(10 marks)

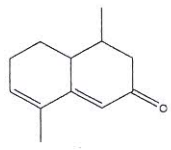
6. What are the qualities of an ideal GC detector? Write in detail about silylation as GC derivatisation technique including advantages and disadvantages.

(10 marks)

7A. Write the expected IR peaks for acetanilide and benzaldehyde.

7B. Calculate $\lambda_{max}$ for the following:

i) $CH_3$-CH=CH-CH=CH-$CH_3$ ii)



(4+6 = 10 marks)

8. Explain any two hyphenated techniques in HPLC.

(10 marks)

9. **Write short notes:**

9A. Applications of the ultra-violet spectroscopy

9B. Stretching and bending vibrations

(5 marks × 2 = 10 marks)

10. **Write briefly on the following:**

10A. Applications of supercritical fluid chromatography

10B. van Deemter equation and its significance

(5 marks × 2 = 10 marks)

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# MANIPAL UNIVERSITY

## FIRST YEAR M. PHARM. DEGREE EXAMINATION – JULY 2015

### SUBJECT: MEDICINAL CHEMISTRY – I (PCH 601T)

(SPECIALIZATION: PHARMACEUTICAL CHEMISTRY)

(2014 REGULATION)

Monday, July 20, 2015

Time: 10:00 – 13:00 Hrs. Max. Marks: 100

**Answer ALL questions.**

1. What are the methods used in fragment based drug discovery screening? Explain in detail any one of them. Write a note on the effect of optical isomerism in pharmacokinetics. (10 marks)

2. Mention different types of phase I metabolic reactions. Discuss in detail oxidative metabolic reactions. (10 marks)

3. Write a note on role of metabolic stability in drug design with examples. (10 marks)

4. Explain the role of drug permeability and solubility with suitable examples. How are they optimized? (10 marks)

5. Discuss voltage gated ion channels as drug targets. Discuss about stages of clinical phase of drug discovery. (10 marks)

6. What are bioisosteres? Explain their role in drug design giving examples. (10 marks)

7. What is radio ligand based assay? How is it performed? Give its application. (10 marks)

8. Explain the effect of optical isomerism on pharmacodynamics. (10 marks)

9. **Write short notes on:**

9A. Binding role of aldehydes and ketones

9B. Advantages of prodrugs

(5 marks × 2 = 10 marks)

10. **Write briefly on the following:**

10A. Macro marine sources in discovery of drugs

10B. General method of determination of any two functional groups

(5 marks × 2 = 10 marks)

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# MANIPAL UNIVERSITY

## FIRST YEAR M. PHARM. DEGREE EXAMINATION – JULY 2015

### SUBJECT: MEDICINAL CHEMISTRY – II (PCH 602T)

**(SPECIALIZATION: PHARMACEUTICAL CHEMISTRY)**

**(2014 REGULATION)**

Wednesday, July 22, 2015

Time: 10:00 – 13:00 Hrs. Max. Marks: 100

1. How is solution phase chemistry superior to solid phase chemistry? Explain with relevant justifications.

(10 marks)

2. What is Protein Engineering? Explain its principle and applications.

(10 marks)

3. What are biomarkers? Classify them with suitable examples. Give their applications.

(10 marks)

4. Explain the chemical, biological and metabolic stability testing for a new chemical entity.

(10 marks)

5. What is Computer-aided drug design? Explain in detail about its molecular mechanics.

(10 marks)

6. Discuss the 3D QSAR methods based on intrinsic molecular properties.

(10 marks)

7. Explain the following parameters:

a) Lipophilicity b) Electronic effects c) Steric factors

(10 marks)

8A. A NCE was screened for its effects on the fasting blood sugar levels in Sprague- Dawley rats for ten days. The fasting blood sugar (mg/dl) in two groups of diabetic rats is as follows after ten days of treatment. Apply an appropriate statistical test to find out whether the NCE was effective in lowering the FBS levels. Justify your results.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Control [STZ- induced diabetes] | 310 | 415 | 340 | 435 | 385 | 390 | 420 | 370 | 360 |
| Test [NCE] | 210 | 245 | 248 | 250 | 200 | 195 | 100 | 196 | 270 |

8B. Describe the properties of a Gaussian distribution.

(5+5 = 10 marks)

9. **Write short notes on:**

9A. Different types of patents and their application

9B. Reactions of both an amino group and a carboxyl group of an amino acid

(5 marks × 2 = 10 marks)

10. **Write briefly on the following:**

10A. Methods to determine pKa of a new chemical entity

10B. Peptide synthesis

(5 marks × 2 = 10 marks)

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# MANIPAL UNIVERSITY

## FIRST YEAR M. PHARM. DEGREE EXAMINATION – JULY 2015

### SUBJECT: ADVANCED ORGANIC CHEMISTRY (PCH 604T)

### (SPECIALIZATION: PHARMACEUTICAL CHEMISTRY)

(2014 REGULATION)

Monday, July 27, 2015

Time: 10:00 – 13:00 Hrs. Max. Marks: 100

- **Answer ALL the questions.**
- **Each question carries TEN marks.**

1. Describe the methods of preparation and chemical reactions of Isoquinoline. What is the difference between its oxidation with that of quinoline with potassium permanganate?

2. What is indolizine? Write the names and structures of aza-indolizines. Give the synthesis of one of them.

3. Discuss the retro synthetic analysis and forward synthesis of Clotrimazole.

4. List out metal catalysts. Write the importance of any three of them in organic synthesis.

5. Explain the mechanism and applications of Swern oxidation and Suzuki-Miyaura cross coupling reaction.

6. What are the different types of aldol reactions? Explain the importance of chiral auxillaries used for alpha alkylation reactions.

7. Discuss the asymmetric catalytic hydrogenation reactions of carbon- carbon double bonds and explain the asymmetric desymmetrization reactions.

8. Discuss aza and oxo Diels-alder reactions.

9. **Write short notes on:**

9A. Mitsunobu reaction

9B. Meerwein-verley-ponndorf reduction

10. **Write briefly on the following:**

10A. Tautomerism in heterocyclics

10B. Chiral separation by column chromatographic methods