MASTER KEY
MASTER KEY OF BOARD QUESTIONS
Master Key Series

PHARMACEUTICAL CHEMISTRY - II

Diploma In Pharmacy Part - II
(Based On Karnataka Pharmacy Board & ER 91)

AYAZ QURAISHI
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PHARMACEUTICAL CHEMISTRY – II
Diploma in Pharmacy Part II
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Ayaz Quraishi
M.Sc. B.Ed. D.Pharm

SALIENT FEATURES
➢ Master answers of Board Questions.
➢ Arrangement of Board Questions with reference to the Chapters.
➢ Board Questions also arranged according to the sub topics of chapters.
➢ Minimum & Maximum Marks of chapters according to Board Papers.
➢ Systematic record of distribution of marks of chapters.
➢ Give central Idea about Board Master Questions.
➢ Analysis, Research & deep study possible.
➢ Easy to understand & memorize.
➢ Give idea to solve paper according to the type & marks of questions.
PREFACE

It is a great pleasure that the Master Key of Pharmaceutical Chemistry-II is in your hand. It is prepared according to heed of D.Pharm student’s ambition and hardship.

The main objective of pharmacy students is to successfully complete the pharmacy course and join Pharmacy job, profession or business. While students acquire the knowledge of pharmacy during their college lectures but they are not having any procedure or executed planning for passing the exams with good score. In exams they are not having complete skills of questions understanding and how to write the answers (definitions, classifications, differences, advantages, disadvantages, properties, uses, etc.) with respect to the questions and marks of questions, therefore often result in the form of failure and finally frustration.

In the light of above mention difficulties of students, the salient features are included in this Master Key. I hope it will be helpful for both students and teachers. After many times of proof-reading the errors may still be inevitable. I am waiting for your opinions, for the identification of errors and improvement of lack of subject matter.

-Author
(1) Index with respect to chapters indicates the minimum and maximum marks. Based on indicated marks, the Random Marks Weightage of chapters can be identified from examination point of view.

(2) The table of distribution of marks explains about each year total asking marks of chapters. Besides that, it also indicates about that questions of some chapters in which year absolutely not asking.

(3) The table of distribution of marks elaborates the significance of repeated asking chapters. It also indicates that, which chapters are essential for the study.

(4) Questions are arranged in each chapter and its sub-topics with respect to questions asked in every year examination.

(5) Double numbering system are kept for questions of sub-topics of chapters, so that to know how many times that topic has been asked and in which year. So that it would also be easy to identify which question has been asked maximum time and understand it as important.

(6) To avoid studying the same answer multiple times, a unique master answer is formed on many asked questions of single topic and similarly, master answers are formed for each topic. So for many questions a unique respective answer will be sufficient for the study.

(7) In the arrangement of topic wise questions, the questions of structures are given first preference. So that student can have more and specific attention on structures.

(8) Most of the questions are placed in miscellaneous questions because they are based on mixed topics.

(9) For analysis, research and deep study of genius students, chapter wise systematic board question bank is arranged.

(10) Most of the students do not have the skill to understand the type of questions and how to solve those questions as per their marks. Therefore “how to solve the question paper” section is also included, in which marking scheme are given according to the points of answers.

(11) To score higher marks, all answers are given in points and with respect to their marks, so that to make it easy for writing and examining.

(12) At the end of the book, some question papers are given for practice.

(13) After complete study of this master key, the students can achieve higher score in their exams.

(14) In the syllabus, the star marking drugs (for structures) are most important therefore students should read it first.
SYLLABUS

I. Introduction to the nomenclature of organic chemical systems with particular reference to hetero-cyclic system containing up to 3 rings.

II. The chemistry of following pharmaceutical organic compounds covering their nomenclature, chemical structure, uses and the important physical and chemical properties (chemical structure of only those compounds marked with asterisk (*)). The stability and storage conditions and the different type of pharmaceutical formulations of these drugs and their popular brand names.


2. Sulphonamides: Sulphadiazone, Sulphaguanidine, Phthalylsulphathiazole, Succinylsulphathiazole, Sulphadimethoxine, Sulphamethoxypyridazine, Co-trimoxazole, Sulfacetamide*

3. Antileprotic Drugs: Clofazimine, Thiambutosine, Dapsone*, solasponge.


5. Antiamoebic and Anthelmintic Drugs: Emetine, Metronidazole, Halogenated hydroxyquinolines, Diloxanide furoate, Paromomycin, Piperazine*, Mebendazole, D.E.C.*


16. **Cholinergic Drugs**: Neostigmine*, Pyridostigmine, Pralidoxime, Pilocarpine, Physostigmine*.

17. **Cholinergic Antagonists**: Atropine*, Hyoscine, Homatropine, Propantheline*, Benztropine, Tropicamide, Biperiden*.


19. **Cardiovascular Drugs**: Ethylnitrite*, Glyceryl trinitrate, Alpha methylldopa, Guanethidine, Clofibrate, Quinidine.


22. **Local Anaesthetics**: Lignocaine*, Procaine*, Benzocaine,

23. **Histamine and anti-Histaminic Agents**: Histamine, Diphenhydramine*, Promethazine, Cyproheptadine, Mepyramine*, Pheniramine, Chlorpheniramine*.


26. **Thyroxine and Antithyroids**: Thyroxine*, Methimazole, Methyl thioracil, Propylthiouracil.

27. **Diagnostic Agents**: Lopanoic Acid, Propylidone, Sulfobromophthalein-sodium, Indigotindisulfonate, Indigo Carmine, Evans blue, Congo Red, Fluorescein sodium.

28. **Anticonvulsants, cardiac glycosides, Antiarrhythmic, Antihypertensives & Vitamins**.

29. **Steroidal Drugs**: Betamethasone, Cortisone, Hydrocortisone, Prednisolone, Progesterone, Testosterone, Oestradiol, Nandrolone.

30. **Anti-Neoplastic Drugs**: Actinomycin, Azathioprie, Busulphan, Chloramubucil, Cisplatin, Cyclophosphamide, Daunorubicin Hydrochloride, Fluorouracil, Mercaptopurine, Methotrexate, Mytomycin.
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HETEROCYCLIC COMPOUNDS

BOARD QUESTIONS & ANSWERS REFERENCES

Name, Structure, Numbering, Uses etc. (Heterocyclic)

Q (1): Name one drug each containing following heterocyclic ring mention it uses:
(a) Tropane [Ans: Refer M.A. (40)-(a) & (b)]
(b) Purine [Ans: Refer M.A. (26)-(a) & (b)]
(c) Pyrrole [Ans: Refer M.A. (7)-(a) & (b)]
(d) Quinoline [Ans: Refer M.A. (30)-(a) & (b)] [Jan.2002-4M]

Q (2): Name one drug each containing the following heterocyclic ring and mention its use:
(a) Oxazole [Ans: Refer M.A. (9)-(a) & (b)]
(b) Indole [Ans: Refer M.A. (28)-(a) & (b)]
(c) Pyrimidine [Ans: Refer M.A. (20)-(a) & (b)]
(d) Quinoline [Ans: Refer M.A. (30)-(a) & (b)] [Jan.2007-4M]

Q (3): Name one drug each containing the following heterocyclic ring and mention its use:
(a) Pyrazine [Ans: Refer M.A. (22)-(a) & (b)]
(b) Furan [Ans: Refer M.A. (4)-(a) & (b)]
(c) Pyrimidine [Ans: Refer M.A. (20)-(a) & (b)]
(d) Quinoline [Ans: Refer M.A. (30)-(a) & (b)] [Aug.2008-4M]

Q (4): Name one drug each containing following heterocyclic ring and mention its uses:
(a) Tropine [Ans: Refer M.A. (40)-(a) & (b)]
(b) Isoquinoline [Ans: Refer M.A. (32)-(a) & (b)]
(c) Imidazole [Ans: Refer M.A. (13)-(a) & (b)]
(d) Isoxazole [Ans: Refer M.A. (11)-(a) & (b)] [Jan.2011-4M]

Q (5): Name one drug each containing following heterocyclic ring and mention its uses: [Apr.2014-4M]
(a) Furan [Ans: Refer M.A. (4)-(a) & (b)]
(b) Isoquinoline [Ans: Refer M.A. (32)-(a) & (b)]
(c) Imidazole [Ans: Refer M.A. (13)-(a) & (b)]
(d) Isoxazole [Ans: Refer M.A. (11)-(a) & (b)]
Q (6): Name any one drug each containing the following heterocyclic ring and mention their uses:
   (a) Quinoline [Ans: Refer M.A. (30)-(a) & (b)]
   (b) Pyridine [Ans: Refer M.A. (18)-(a) & (b)]
   (c) Imidazole [Ans: Refer M.A. (13)-(a) & (b)]
   (d) Purine [Ans: Refer M.A. (26)-(a) & (b)] [Apr.2015-4M]

Q (7): Give one example each for the drugs containing following ring system.
   (i) Quinoline [Ans: Refer M.A. (30)-(a)]
   (ii) Indole [Ans: Refer M.A. (28)-(a)]
   (iii) Imidazole [Ans: Refer M.A. (13)-(a)]
   (iv) Acridine [Ans: Refer M.A. (35)-(a)] [May 2001-4M]

Q (8): What are heterocyclic compounds write the structure of:
   (i) Thiadiazole [Ans: Refer M.A. (1) & (16)]
   (ii) Pyridine [Ans: Refer M.A. (1) & (17)]

Q (9): Write the structure and numbering of:
   (a) Thiazole [Ans: Refer M.A. (14)]
   (b) Piperazine [Ans: Refer M.A. (23)]
   (c) Pyrimidine [Ans: Refer M.A. (19)]
   (d) Indole ring [Ans: Refer M.A. (27)] [Jan.2013-4M]

Q (10): Give the structural formula of the drugs containing the following:
   (a) Isoquinoline [Ans: Refer M.A. (31)]
   (b) Indole [Ans: Refer M.A. (51)]
   (c) Thiazole [Ans: Refer M.A. (14)]

Q (11): Write the structural formulae with numbering for the following:
   (a) Furan [Ans: Refer M.A. (3)]
   (b) Oxazole [Ans: Refer M.A. (8)]
   (c) Pyrimidine [Ans: Refer M.A. (19)]
   (d) Quinoline [Ans: Refer M.A. (29)] [Dec.2003-4M]

Q (12): Write the structural formula with numbering for the following.
   (a) Furan [Ans: Refer M.A. (3)]
   (b) Isoxazole [Ans: Refer M.A. (10)]
   (c) Pyrazine [Ans: Refer M.A. (21)]
   (d) Isoquinoline [Ans: Refer M.A. (31)] [Jan.2007-4M]
Q (13): (13): Write the structural formulae with numbering for the following:
(a) Oxazole [Ans: Refer M.A. (8)]
(b) Indole [Ans: Refer M.A. (27)]
(c) Purine [Ans: Refer M.A. (25)]
(d) Isoquinoline [Ans: Refer M.A. (31)] [Aug.2008-4M]

Q (14): (14): Give the structures of:
(i) Furan [Ans: Refer M.A. (3)]
(ii) Quinoline [Ans: Refer M.A. (29)]

Q (15): (15): Write the structural formulae with numbering for the following:
(a) Quinoline [Ans: Refer M.A. (29)]
(b) Pyrimidine [Ans: Refer M.A. (19)]
(c) Isoxazole [Ans: Refer M.A. (10)]
(d) Furan [Ans: Refer M.A. (3)] [Jan.2012-4M]

Q (16): (16): Write the structural formula with numbering for the following:
(a) Quinolone [Ans: Refer M.A. (33)]
(b) Pyrimidine [Ans: Refer M.A. (19)]
(c) Isoxazole [Ans: Refer M.A. (10)]
(d) Furan [Ans: Refer M.A. (3)] [Apr.2014-4M]

Q (17): (17): Write the structure of the following heterocyclic rings with the numbering:
(a) Isoquinoline [Ans: Refer M.A. (31)]
(b) Pyrazine [Ans: Refer M.A. (21)]
(c) Imidazole [Ans: Refer M.A. (12)]
(d) Furan [Ans: Refer M.A. (3)] [Apr.2016-4M]

Q (18): (18): Write the structures of the following:
(a) Indole [Ans: Refer M.A. (27)]
(b) Thiophene [Ans: Refer M.A. (5)]
(c) Imidazole [Ans: Refer M.A. (12)]

Q (19): (19): Name one drug each containing the following heterocyclic ring and mention its uses:
(a) Isoquinoline (b) Pyrazine (c) Pyridine (d) Furan
[Ans: Refer M.A. {(32)-(a) & (b)}, {(22)-(a) & (b)}, {(18)-(a) & (b)}, {(4)-(a) & (b)}] [Dec.2016-1+1+1+1M]

Q (20): (20): Name one drug each containing the following heterocyclic ring and mention its use: [Dec.2003-1M]
(a) Purine [Ans: Refer M.A. (26)-(a) & (b)]
Q (21): Name one drug each containing the following heterocyclic ring and mention its use:
(a) Thiazole [Sep.2004-1M]
[Ans: Refer M.A. (15)-(a) & (b)]

Q (22): Name one drug each containing the following heterocyclic ring and mention its use: (a) Furan [Sep.2004-1M]
[Ans: Refer M.A. (4)-(a) & (b)]

Q (23): Name one drug each containing the following heterocyclic ring and mention its use:
[Ans: Refer M.A. (22)-(a) & (b)]

Q (24): Name one drug each containing the following heterocyclic ring and mention its use:
(a) Imidazole [Dec.2003-1M] [Ans: Refer M.A. (13)-(a) & (b)]

Q (25): Name one drug each containing the following heterocyclic ring and mention its use:
(a) Pyridine [Sep.2004-1M]
[Ans: Refer M.A. (18)-(a) & (b)]

Q (26): Name one drug each containing the following heterocyclic ring and mention its use:
(a) Indole [Dec.2003-1M]
[Ans: Refer M.A. (28)-(a) & (b)]

Q (27): Give the structure and use of a drug containing the following Heterocyclic ring:
(a) Thiazolidine [Mar.2008-2M]
[Ans: Refer M.A. (41) & (42)]

Q (28): Give the structure and use of a drug containing the following Heterocyclic ring:
(a) Piperidine [Mar.2008-2M]
[Ans: Refer M.A. (43) & (44)]

Q (29): Name the heterocyclic rings present in the following drugs and write their uses:
(a) Metronidazole [Jan.2010-1M]
[Ans: Refer M.A. (46)-(a) & (b)]

Q (30): Name the heterocyclic rings present in the following drugs and write their uses:
(a) Chloroquine [Jan.2010-1M]
[Ans: Refer M.A. (48)-(a) & (b)]

Q (31): Name the heterocyclic rings present in the following drugs and write their uses: [Jan.2010-1M]
(a) Furosemide [Ans: Refer M.A. (50)-(a) & (b)]
Q (32): (32): Name the heterocyclic rings present in the following drugs and write their uses:
(a) Indomethacin [Jan.2010-1M]
[Ans: Refer M.A. (52)-(a) & (b)]

Q (33): (33): Write the structural formulae with numbering for the Piperazine, Indole, Phenazine and Oxazole.
[Jan.2011-4M] [Ans: Refer M.A. (23), (27), (36) & (8)]

Q (34): (34): Write the structure and chemical name of Phenothiazine.
[Oct.2005-2M] [Ans: Refer M.A. (37)]

Q (35): (35): Write the structure of Indole, Pyrazine and Phenothiazine.
[Aug.2006-3M] [Ans: Refer M.A. (27), (21) & (37)]

Q (36): (36): Give the structures of Furan and Quinoline. [Jul.2009-2M]
[Ans: Refer M.A. (3) & (29)]

### Miscellaneous

Q (37): (1): What are heterocyclic compounds? Give two examples and their structure.[Feb.2006-4M]
[Ans: Refer M.A. (1), (3) & (5)]

Q (38): (2): What are heterocyclic compounds? Write the structures of any three compounds giving their names and numbering of their rings. [Sep.2004-4M]
[Ans: Refer M.A. (1), (3), (5) & (6)]

[Ans: Refer M.A. (1) & (2)]

Q (40): (4): What are heterocyclic compounds?
[Ans: Refer M.A. (1)]

### MASTER ANSWERS

(1) **Heterocyclic Compounds:**
(i) **Definition:** It is defined as,
“The cyclic compounds containing carbon and at least one hetero atom such as Oxygen, Nitrogen, or Sulphur in the ring system are known as Heterocyclic compounds.”
(ii) It may contain two or more same or different atom in the cyclic ring.
(iii) The word Heterocyclic derived from Greek word, here Heteros means other and the complete word is as, Heterocyclic = Other + Cycle.

(iv) They are having great importance in life, occur in nature and also manufactured in Pharmaceutical Industry in the form of drugs.

(v) eg: Furan, Thiophene, Pyrrole, Pyridine, Pyrazine, Acridine, Indole, Quinoline etc.

(2) **Classification of Heterocyclic Compounds:**

They are broadly classified as follows:

(a) Three Membered  eg: Aziridine, Oxirane and Thirane
(b) Four Membered  eg: Azetidine, Oxetane and Thetane
(c) Five Membered  eg: Furan, Thiophene and Pyrrole
(d) Six Membered  eg: Pyrazine, Pyridine and Piperidine
(e) Heterocyclic Ring Fused with Benzene  eg: Indole, Quinoline, Isoquinoline, Acridine and Phenothiazine

(3) **Furan (Structure, Name & Numbering):**

```
4

1

2

3

5
```

Furan

(4) **Furan Containing Drug (Name & Uses):**

(a) Name of Furan Containing Drug: Furosemide
(b) Uses of Furosemide: (i) It is used as diuretic drug.

(5) **Thiophene (Structure, Name & Numbering):**

```
4

1

2

3

5
```

Thiophene
Master Key (Pharmaceutical Chemistry – II)

(6) **Pyrrole (Structure, Name & Numbering):**

![Pyrrole diagram]

**Pyrrole**

(7) **Pyrrole Containing Drug (Name & Uses):**

(a) Name of Pyrrole Containing Drug: Poldine Methyl Sulphate

(b) Uses of Poldine Methyl Sulphate:
   (i) It is used as antispasmodic & anti-ulcer drug.

(8) **Oxazole (Structure, Name & Numbering):**

![Oxazole diagram]

**Oxazole**

(9) **Oxazole Containing Drug (Name & Uses):**

(a) Name of Oxazole Containing Drug: Sulphamethoxazole

(b) Uses of Sulphamethoxazole:
   (i) It is used in the treatment of Lower respiratory tract infections
   (ii) It is used in the treatment of urinary tract infections.

(10) **Isoxazole (Structure, Name & Numbering):**

![Isoxazole diagram]

**Isoxazole**

(11) **Isoxazole Containing Drug (Name & Uses):**

(a) Name of Isoxazole Containing Drug: Sulphafurazole

(b) Uses of Sulphafurazole:
   (i) It is used in the treatment of bladder infections & ear infections.
(12) **Imidazole (Structure, Name & Numbering):**

![Imidazole structure](image)

Imidazole

(13) **Imidazole Containing Drug (Name & Uses):**
(a) Name of Imidazole Containing Drug: Metronidazole
(b) Uses of Metronidazole: (i) It is used as antiprotozoal.
    (ii) It is used as antibacterial.

(14) **Thiazole (Structure, Name & Numbering):**

![Thiazole structure](image)

Thiazole

(15) **Thiazole Containing Drug (Name & Uses):**
(a) Name of Thiazole Containing Drug: Benzyl Penicillin (Penicillin G)
(b) Uses of Benzyl Penicillin:
    (i) It used as narrow spectrum antibiotics.

(16) **Thiadiazole (Structure, Name & Numbering):**

![Thiadiazole structure](image)

Thiadiazole
(17) **Pyridine (Structure, Name & Numbering):**

![Pyridine](Image)

(18) **Pyridine Containing Drug (Name & Uses):**

(a) Name of Pyridine Containing Drug: Isoniazid (INH)
(b) Uses of Isoniazid (INH):
   (i) It is used in the treatment of pulmonary tuberculosis.

(19) **Pyrimidine (Structure, Name & Numbering):**

![Pyrimidine](Image)

(20) **Pyrimidine Containing Drug (Name & Uses):**

(a) Name of Pyrimidine Containing Drug: Propylthiouracil
(b) Uses of Propylthiouracil:
   (i) It is used for the treatment of thyrotoxicosis.

(21) **Pyrazine (Structure, Name & Numbering):**

![Pyrazine](Image)

(22) **Pyrazine Containing Drug (Name & Uses):**

(a) Name of Pyrazine Containing Drug: Pyrazinamide
(b) Uses of Pyrazinamide:
   (i) It is used in the treatment of tuberculosis.
(23) **Piperazine (Structure, Name & Numbering):**

```
N   N
1  2
3  4
5  6
```

Piperazine

(24) **Piperazine Containing Drug (Name & Uses):**
- (a) **Name of Piperazine Containing Drug:** Piperazine Citrate
- (b) **Uses of Piperazine Citrate:**
  - (i) It is used in the treatment of round worm infection diseases.
  - (ii) It is used in the treatment of thread worm infection diseases.

(25) **Purine (Structure, Name & Numbering):**

```
N   N   N   N
1  2  3  4
5  6  7  8
```

Purine

(26) **Purine Containing Drug (Name & Uses):**
- (a) **Name of Purine Containing Drug:** Mercaptopurine
- (b) **Uses of Mercaptopurine:**
  - (i) It is used in the treatment of Leukaemia.

(27) **Indole (Structure, Name & Numbering):**

```
N   N
1  2
3  4
5  6
```

Indole
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