PHILADELPHIA UNIVERSITY

Faculty of Pharmacy

Pharmacognosy and Phytochemistry – Final Exam

Instructor: Dr. Yousef Abusamra

Name: _____ **Student No.:** _____

Date: 3/2/2016 **Section - الشعبة (** **)** **Time: 1:45 – 3:45**

Question	A	B	C	D	E
1					
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Question	A	B	C	D	E
21					
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24					
25					

- Try to answer all questions.
- The total number of pages of the exam including this first page bearing information about the examiner is **6.**
- Total possible marks: **53** (3 marks bonus).

MARK DISTRIBUTION:

Multiple choices: /25

True/false: /10

Questions with spaces: /8

Statement questions: /10

Total mark: **/50**

/40

Answer the following multiple-choice questions (1-25): [1 mark each]

1. The mechanism of action of cardiac glycosides includes:
a. Inhibition of the action potentials arriving to heart.
b. Causing edema to help heart contract well.
c. Prevention of the secretion of sodium.
d. Inhibition of ATPase that regulates mobility of Na and K ions.
e. Increase of the conduction between the atrium and the ventricle of the heart.

2. All the followings are true concerning the chemical structure of cardiac glycosides except:
a. The lactone ring is attached to C-18.
b. Sugar moiety is attached via the hydroxyl group on C-3.
c. The existence of two hydroxyl group on C-3 and C-14 in β-orientation.
d. A and B.
e. B and C.

3. Which family is rich in cardiac glycosides?
a. *Fabaceae.*
b. *Apocynaceae*.
c. *Rubaceae*.
d. *Rutaceae*.

4. All the followings are <u>true</u> except:
a. The part of *Digitalis purpurea* rich in cardiac glycosides is the leaf.
b. The glycosides in *Digitalis purpurea* can be classified to three divisions according to the aglcone.
c. The sugar moiety in digitoxin is the same as that in gitaloxin except the existence of glucose in gitaloxin.
d. Gitaloxigenin has a substitution on C-16, whereas digitoxigenin doesn't have any.
e.Verdoxin is a minor glycoside in *Digitalis*.

5. Cardiac glycosides originate from …… .
a. Mevalonic acid.
b. Squalene.
c. Shikimic acid.
d. Dihydroxyindole.
e. Pyruvic acid.

6. The aglycone of lanatoside C in *Digitalis lanata* is:
a. Lanatoside A.
b. Digoxigenin.
c. Acetyldigitoxigenin.
d. Gitoxigenin.
e. Gitaloxigenin.

7. All the followings are <u>false</u> except:
a. Low—safety margin of digitoxin, means it can be given without much care.
b. Because it is given to heart disease, digitoxin overdose doesn't lead to arrhythmias.
c. Because of the differences in absorption, digitoxin is more potent than gitoxin.
d. Medications containing digitalis leaf are no longer used because of the big variations in their content of cardiac glycosides.

8. Digoxin differs in the chemical structure from digitoxin by:
a. Having OH- on C-16 instead of CH_3.
b. Having CHO- on C-13 instead of CH_3.
c. Having OH- on C-13 instead of CH_3.
d. Having OH- on C-12.
e. Having CHO- on C-16.

9. Removal of the terminal glucose residue and deacetylation of the third digitoxose sugar results in:
a. Digitoxin.
b. Digoxin.
c. Lanatoside C.
d. Deacetyllanatoside C.

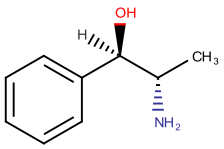
10. G-strophanthin is obtained from the … of *Strophanthus gratus.*
a. Leaves.
b. Fruits.
c. Bark.
d. Seeds.

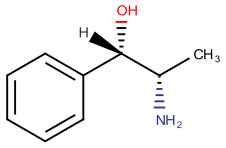
11. Convallotoxin and convalloside are two main cardiac glycosides contained in the rhizome of:
a. *Strophanthus kombe*.
b. Lilly-of-the-valley.
c. Squill.
d. *Adonis vernalis.*

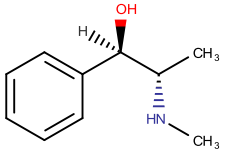
12. Which family of the followings contains glucoscillarin A?
a. *Apocynaceae*.
b. *Rutaceae*.
c. *Liliaceae*.
d. *Ranunculaceae*.

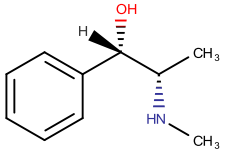
13. All the followings are <u>true</u> except:
a. Alkaloids are groups of nitrogenous compounds whose classification is a little bit more complex than other secondary metabolites.
b. Mostly, they are derived from amino acids.
c. Generally, they are basic in nature due to a positive charge on the nitrogen atom.
d. They occur in all parts of the plants.
e. The site of biosynthesis is **<u>not</u>** necessarily the site of storage of alkaloids.

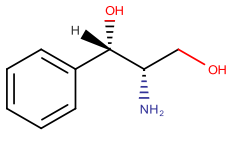
14. ……, which is a main alkaloid in Khat also appears as an intermediate compound in biosynthesis of ephedrine.
a. Thiamine diphospahte.
b. Pyrimidine residue.
c. Cathinone.
d. Norephedrine.
e. Pseudoephedrine.

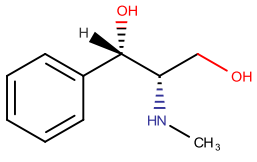
15. Given the following structure of <u>(-)-norephedrine</u>  **, then the chemical structure of <u>(+)-pseudoephedrine</u> is:**

a. 

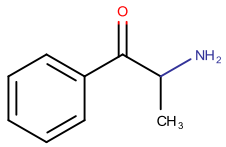
b. 

c. 

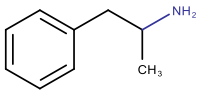
d. 

e. 

16. If you know that cathinone is a stimulant alkaloid, and has the following structure



, accordingly, the following structure,



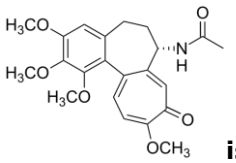
and because of the clear similarity is expected to refer to:

a. An anti-histamine.
b. Atropine.
c. Morphine.
d. Nicotine.
e. Amphitamine.

17. …… is an alkaloid that is not used therapeutically, and is used mainly to induce models of psychosis:

a. Nicotine.
b. Morphine.
c. Capsaicin.
d. Ephedrine.
e. Mescaline.

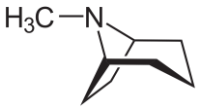
18. The alkaloid that has this following structure



is medically used as:

a. Antispasmodic.
b. Antiarrhythmic.
c. Anticholinergic.
d. Anti-cancer.
e. Anti-gout.

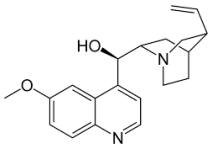
19. Alkaloids containing this base



occur in all these genera except:

a. *Atropa.*
b. *Ephedra.*
c. *Datura.*
d. *Hyoscymus*.

20. The alkaloid with this chemical structure



can be taken from:

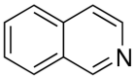
a. *Cinchona succirubra.*
b. *Ephedra sinica.*
c. *Erythroxylum coca.*
d. *Convallaria majalis.*
e. *Datura stramonium.*

21. *Nicotiana tobacum* is rich in an alkaloid whose structure contains the following base:

a. 

b. 

c. 

d. 

22. An alkaloid that is used in glaucoma, and has side effects related to its cholinergic effect (parasympathomimetic) is:
a. Atropine.
b. Cathinone.
c. Arecoline.
d. Pilocarpine.

23. What is the plant species that is famous for its medical indication as anti-cancer (e.g. Hodgkin's disease):
a. *Pappaver somniferum.*
b. *Rauwolifia serpentina.*
c. *Catharanthus roseus.*
d. *Chondrodendrum tomentosum.*

24. *Rauwolfia serpentina* is famous for its activity as:
a. Stimulant.
b. Antihypertensive.
c. antidote in the poisoning with organophosphorus insecticides.
d. Antiarrhythmic.
e. Anti-cancer.

25. Heroin is more lipid-soluble than morphine, because it:
a. Contains three hydroxyl groups in its structure.
b. Contains an amide in its structure, whereas morphine doesn't.
c. Is a diacetylated alkaloid, and morphine, instead, is dihydroxylated.
d. Has a longer hydrocarbon side chain that increases lipophilicity.

Answer with (true) or (false) the following questions (26-35): [1 mark each]

26. Biogenetic classification of drugs from natural sources is concerned in studying drugs from a phytochemical point of view.

27. An indigenous plant is that plant that is cultivated in a country other than its native one.

28. Plant tissue culture technique is a type of cultivation.

29. In plant tissue culture technique, it is **only** possible to use cells from extensively growing organs of the plant to form a callus.

30. Karl-Fischer titration method is **more** sensitive than loss on drying method in determination of moisture.

31. In quality control norms (basics), it is preferred to have a **bigger** solvent residue value in the sample.

32. A **disadvantage** of Soxhlet extraction is that it is not economic as it consumes much solvent.

33. Cascara and buckthorn are **similar** in their therapeutic indication and the part of the plant used as a laxative.

34. Stereochemistry is important for the activity of cardiac glycosides; if the hydroxyl group on C-3 is in the α-orientation, the activity is lost.

35. Gitaloxigenin and gitoxigenin differ from each other in the degree of oxidation on C-13.

Fill in the spaces in the following statements with correct and suitable answers (36-42): [1 mark each]

36. …… is an alkaloid from opium, and is used to increase blood flow in the body.

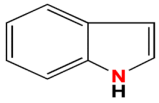
37. The part of *Ipecacuahna* rich in emetine and cephaeline is …… .

38. The plant family to which goldenseal plant belongs is …….. .

39. Bis-benzylisoquinoline is the base in the chemical structure of the alkaloid……,

that can be used in ……. poisoning.

40. …… is a plants rich in alkaloids that contain the following base



in their chemical structure.

41. …… is an example of pseudo-alkaloids.

42. ……. is an alkaloid that is used to diagnose or treat myasthenia gravis.

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Answer the following questions (43-47): [1 mark for each point]

43. What is a true or typical alkaloid?

44. Mention two hypothesized roles of alkaloids in plants:

I. II.

45. Write down two indications of tropane alkaloids?

I.

II.

46. *Cinchona* alkaloids can be used as:

I. II.

47. List down two possible uses of ergot alkaloids:

I. II.

Good Luck