Subject: **Chemistry**
Paper name: **Natural products**
Paper No: **XII-B(T) (CHEM/6/CC/364B)**
Semester: **VI**

A. Multiple Choice Questions.

1. In the biosynthesis of terpenes, condensation of dimethylallyl diphosphate and isopenetenyl diphosphate gives:
   (a) Farnesyl pyrophosphate
   (b) Squalene
   (c) Geranyl pyrophosphate
   (d) Geranylgeranyl pyrophosphate

2. How many carbon atoms are found in diterpenoids:
   (a) 10
   (b) 15
   (c) 20
   (d) 25

3. The number of isoprene unit present in triterpene is:
   (a) 3
   (b) 4
   (c) 5
   (d) 6

4. Which of the following reagents can be used for the detection of alkaloids:
   (a) Fehling's solution
   (b) Meyer's reagent
   (c) Molisch's reagent
   (d) Biuret reagent

5. Carotenoids is an example of:

(a) Sesquiterpenes

(b) Sesterterpenes

(c) Triterpenes

(d) Tetraterpenes

6. In the structure determination of compounds using UV-Visible spectroscopy, carbonyl group usually shows absorption maximum due to which excitation

(a) $\sigma \rightarrow \sigma^*$

(b) $n \rightarrow \pi^*$

(c) $\sigma \rightarrow \pi^*$

(d) $n \rightarrow \sigma^*$

7. Herzig-Meyer method is used for the estimation of:

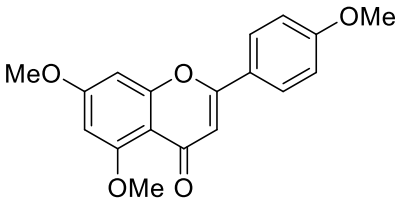
(a) N-methyl group

(b) C-methy group

(c) methoxyl group

(d) hydroxyl group

8. In the following compound, a sharp peak at 1700 cm^{-1} was observed in its IR spectra.



It is due to the presence of:

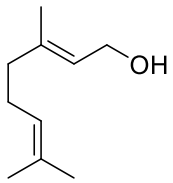
(a) Aromatic ring

(b) methoxyl group

(c) methyl group

(d) carbonyl group

9. How many ^{1}HNMR signals do you expect from geraniol?



(a) 5

(b) 7

(c) 9

(d) 11

10. Which of the following statement is true with respect to mass spectra?

(a) The molecular ion peak is always the base peak

(b) Mass spectrophotometer detects only the positive ion radical

(c) Metastable ion peaks are much broader and are of relatively high abundance

(d) McLafferty rearrangement involves migration of δ-hydrogen atom

11. All naturally occurring germacranolides arises from:

(a) *cis*-geranyl pyrophosphate

(b) *trans*-geranyl pyrophosphate

(c) *cis*-farnesyl pyrophosphate

(d) *trans*-farnesyl pyrophosphate

12. Which of the following statement is true with respect to (-) Abietic acid?

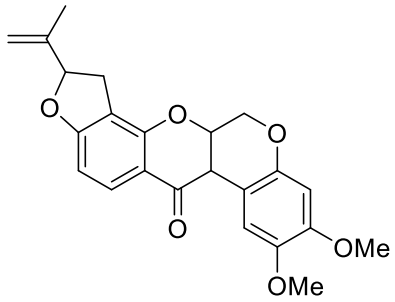
(a) It is a triterpene

(b) It has three chiral centres

(c) It is a tricyclic, di-unsaturated acid

(d) On oxidative degradation it yields ergosterol

13. The number of chiral centre(s) present in naturally occurring (-)-rotenone is:



(a) 1

(b) 2

(c) 3

(d) 4

14. Stereoisomers which are not mirror images are called:

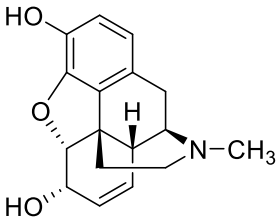
(a) Enantiomers

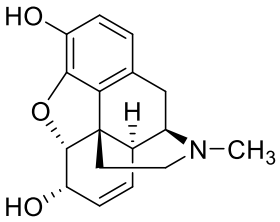
(b) Diastereomers

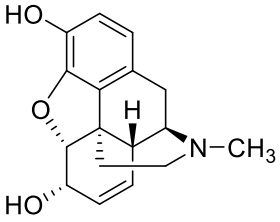
(c) Meso compounds

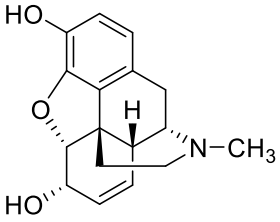
(d) Metamers

15. The absolute stereochemistry of naturally occurring morphine is:

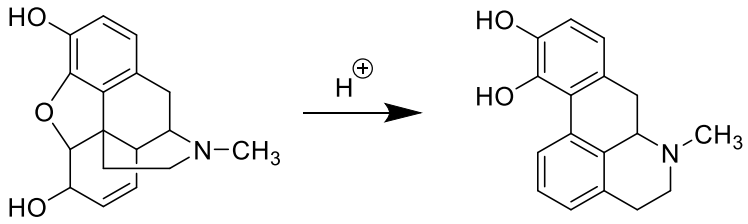
a) 

b) 

c) 

d) 

16. In the following acid catalysed rearrangement of morphine to apomorphine, the number of water molecule eliminated in the process is:



(a) 1

(b) 2

(c) 3

(d) None of the above

17. Wesley-Moser rearrangement reaction involves rearrangement of:

(a) Alkaloids

(b) Steroids

(c) Flavonoids

(d) Carbohydrates

18. Rearrangement of (+)-camphor to (-)-camphor and vice versa involves migration of:

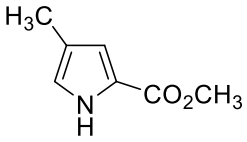
(a) Proton

(b) Hydroxyl group

(c) Methoxyl group

(d) Methyl group

19. The following compound, 4-methylpyrrole-2-carboxylate secreted by leaf-cutting ant is:



(a) Sex pheromone

(b) Trail pheromone

(c) Alarm pheromone

(d) Aggregating pheromone

20. Which of the following is not a type of defensive secretions by insects:

(a) Sporting red colour

(b) Ants venoms

(c) Squirting odorous spray

(d) All of the above

21. Which of the following is not a class of semiochemical:

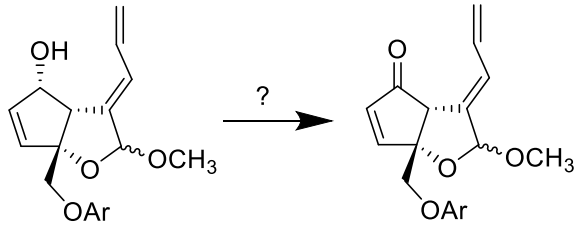
(a) Repellents

(b) Allomones

(c) Pheromones

(d) Anthocyanins

22. In the following reaction, hydroxyl group is converted into ketonic functionality,



Which of the following reagent could be employed for the above transformation?

(a) Pyridinium dichromate

(b) Lithium aluminium hydride

(c) Grubb's catalyst

(d) 4-Dimethylaminopyridine (DMAP)

23. The first step in the synthesis of paraconic acid is:

(a) Friedel Craft's alkylation

(b) Aldol reaction

(c) Mannich reaction

(d) Diels-Alder reaction

24. The primary building block of all benzylisoquinoline alkaloids is:

(a) L-Tyrosine

(b) L-Phenylalanine

(c) L-Histidine

(d) None of the above

25. The precursor for the biosynthesis of morphine is:

(a) (*R*)-5-hexadecanolide

(b) (*R*)-reticuline

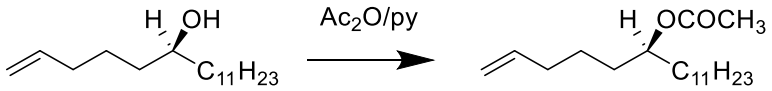
(c) (*R*)-salutaridine

(d) (*R*)-stylopine

B: Fill up the Blanks

1. Terpenes are classified depending on the number of_____involved.
2. Condensation of geranylgeranylpyrophosphate with IDP leads to C25 skeleton, which is precursor of_____.
3. In Hoffmann degradation of alkaloids, elimination of tertiary amines usually proceeds by_____.
4. In the classical methods used for determinations of structures, ozonolysis is used to study the presence of_____.
5. A broad but intense peak at about_____cm^{-1} indicated the presence of hydroxyl group in a compound.
6. The distance between the centres of two adjacent peaks in a multiplet (^{1}HNMR) is usually constant and is called_____.
7. The number of chiral centres present in Menthol is_____.
8. Rotenone has four chiral centres and all naturally occurring rotenoids have three rings with_____fused.
9. (-)-Abietic acid is a tricyclic, di-unsaturated, monocarboxylic acid having_____chiral centres.
10. Nametkin rearrangement is closely related to_____rearrangement.
11. Thebaine undergoes skeletal rearrangement on treatment with_____.

12. Muscalure a natural product isolated from female housefly *Musca domestica* is an example of_____pheromone
13. The following transformation of -OH group brought about by Ac_2O in pyridine is known as_____.



14. The enzyme responsible for the transformation of flavones to isoflavone is_____.
15. In the biosynthesis of benzylisoquinoline alkaloids, regiospecific hydroxylation of phenylalanine results in the formation of_____.

Key answer:

A. Multiple Choice Questions

1. (c)
2. (c)
3. (d)
4. (b)
5. (d)
6. (b)
7. (a)
8. (d)
9. (c)
10. (b)
11. (d)
12. (c)
13. (c)
14. (b)
15. (a)
16. (a)
17. (c)
18. (d)

19. (b)
20. (d)
21. (d)
22. (a)
23. (d)
24. (b)
25. (b)

B. Fill up the Blanks

1. isoprene units
2. sesterterpenes/sestertepenoids
3. E2 mechanism

Unit 2:

4. double bond
5. 3300 – 3500
6. coupling constant

Unit 3:

7. three (3)
8. cis
9. four (4)
10. Wagner-Meerwin
11. mineral acids/phenyl magnesium iodide
12. sex

Unit 5:

13. acetylation
14. cytochrome P 450
15. *L*-tyrosine