KATHMANDU UNIVERSITY
End Semester Examination
January, 2025

Marks Scored:

Level : B.Pharm
Year : I

Course : MATH 102
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date : 25 Jan 2025

SECTION "A"
[10Q. × 1 = 10 marks]

Fill in the blank space(s) by writing the most appropriate word(s) or symbol(s).

1. The graphical representation of cumulative frequency and class intervals is known as _____.
2. The quartiles divides the whole data into _____ equal parts.
3. During the measure of kurtosis, if b2>3 then the curve is _____.
4. If the value of P (A/B) and P (B) are 0.04 and 0.28 respectively, then P (AB) is _____.
5. In probability distribution, the variance for constant is always _____.
6. The X ~B (n. p) then the mean of the distribution is _____.
7. The parameter for the _____ distribution is μ and $\sigma 2$.
8. If n/N=0.03 then finite population multiplier is _____, for the calculation of Standard Error of Estimate (S.E).
9. In any case, if population standard deviation is clearly mentioned then _____ test is followed.
10. The process of determining the unknown values of 'y' using known value of 'x' is known as _____.

SECTION "B"

[10 Q.× 1 = 10 marks]

Fill in the blank space(s), **DO NOT TICK**, by selecting the most appropriate answers from among the given ones.

11. The line drawn by joining the midpoint of each bar of histogram is :
[Frequency curve — Cumulative frequency curve.
Scatter plot — None of the above.]

12. If Mean> Median> Mode then data is:
[Symmetrical — Right skewed — Left skewed — All of the above.]

13. If events A and B are independent to each other. Then conditional probability, P (A/B) can be written as:
[$\frac{P(AB)}{P(B)}$ — P (B) — P (A) — P (AB)]

14. Which of the following distribution has same mean and variance?
[Binomial distribution — Poisson distribution
Normal distribution — None of the above]

15. If the values for x, μ and σ are 13, 15 and 3.5 respectively then the value for standard normal variable (z) is :
[-0.87 — -0.57 — -0.22 — 0.15]

16. If the size of sample decreases then width of confidence interval:
[Increases — Decreases — Constant — None of the above]

17. "Rejecting null hypothesis when it is true." is known as:
[Type I error. — Type II error — Power of test — None of the above]

18. If nothing is mentioned about the level of significance in hypothesis testing, then it should be:
[10% — 6% — 5% — 1%]

19. If r=0.656 then the relationship between two variables 'x' and 'y' is:
[Perfectly positive — Highly positive — Highly negative — None of the above]

20. In a regression equation, y=3.2+0.2x, if the value of 'x' is 6 then 'y' will be:
[2 — 3.2 — 6 — None of the above.]

KATHMANDU UNIVERSITY
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January, 2025

Level : B.Pharm
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Time : 2 hrs. 30mins.

24 Jan 2025

Course : MATH 102
Semester : II
F. M. : 55

SECTION "C"
[3Q × 7 = 21 marks]

1. A survey to learn how much time science students use social sites such as facebook, tiktok, twitters, instagram etc. On the questions asked, "How many hours do you surf Social Sites in a week?" A survey on forty eight students revealed the following data:

58	13	63	22	63	59	87	86	77	56	44	32
60	69	94	66	81	38	43	103	64	28	54	58
52	30	49	50	52	96	16	26	44	48	68	70
18	36	48	40	48	54	55	59	69	62	91	37

a. Form stem and leaf display of the given data set and interpret the result.
b. Construct a grouped frequency distribution having seven classes of equal width starting from the smallest value to the given data above.
c. Draw a histogram from the data and construct frequency curve.

2. Notwithstanding the Equal Pay Act of 1963, in 1993 it still appeared that men earned more than women in similar jobs. A random sample of 38 male machine tool operators found a mean hourly wage of \$11.38, and the sample standard deviation was \$1.84. A random sample of 45 female machine-tool operators found their mean wage to be \$8.42, and the sample standard deviation was \$1.31. On the basis of these samples,
a. Set the null hypothesis and alternative hypothesis for male and female tool operators.
b. At $\alpha = 0.05$ that the male operators are earn more per hour than the female operators?
c. Calculate the *p-value* while testing the hypothesis in the above problem and give your decision.

3. An instructor is interested in finding out how the number of students absent on a given day is related to the mean temperature that day. A random sample of 10 days was used for the study. The following data indicate the number of students absent (ABS) and the mean temperature (TEMP) for each day.

ABS (y) :	8	7	5	4	2	3	5	6	8	9
TEMP (x):	10	20	25	30	40	45	50	55	59	60

a. Plot the data and interpret its meaning and also find the correlation coefficient.
b. Fit the simple regression model for number of students absent (ABS).
c. Find the values of coefficient of determination & standard error of estimate and interpret their meanings.

P.T.O.

SECTION "D"

[6Q × 4 = 24 marks]

4. Scores of two golfers for 10 rounds were as follows:

Golfer A	74	75	78	78	72	77	79	78	81	76
Golfer B	86	84	80	88	89	85	86	82	82	79

Find which golfer may be considered to be more consistent player.

5. In a certain factory, machines I, II, and III are all producing springs of the same length. Of their production, machines I, II, and III produce 3%, 1%, and 2% defective springs respectively. Of the total production of springs in the factory, machine I produce 30%, machine II produces 20%, and machine III produces 50%.If one spring is selected at random from the total springs produced in a day, find the probability that it is defective and also find the posterior probabilities.

6. On the average, 4 customers per minute at any one of the checkout counters of a grocery store. What is the probability that there will be exactly 2 customers in a minute? Also find out probability that there will be at least 3 customers arriving at a checkout counter in the next two minute?

7. The weekly wages of workmen are normally distributed around a mean of Rs 75 with a standard deviation of Rs 10. Find the probability of workers when weekly wages will be between Rs 65 and 80. Also find the limit for middle 70 % workers.

8. A sample of 60 households drawn from a city area containing 14845 total households. It was known that the average household size is 3.4 and standard deviation is 1.22. Estimate the total city population at 97% confidence level. If the confidence level is further increased then what happen to the width of confidence interval? Explain.

9. The manufacturer of Shilpa pharmacy claims that have a mean life of the injection is 25 months. A random sample of 9 such injection gave the following values:
Life in months: 24, 26, 32, 28, 20, 20, 23, 27 and 34.
Can you regard the manufacturer's claim to be valid at 5% level of significance?

SECTION "E"

[5Q × 2 = 10 marks]

10. Find the mode from the data below:

Sales (000)	10-20	20-30	30-40	40-50
No. of pharmaceutical company	6	11	19	15

11. The following table contains the probability distribution of the number of traffic accidents daily in a small city. Find the expected number of accidents per day.

Accidents daily(X):	0	1	2	3	4	5
P(X):	0.10	0.20	0.45	0.15	0.05	0.05

12. At a particular university it has been found that 25% of the students withdraw without completing the Scientific Approach course, assume that 15 students have registered for the course this semester. What is the probability that none will withdraw?

13. A researcher wants to estimate universe mean by using sampling techniques. What should be the sample size when the permissible error will not be more than 1.5 with 98% confidence level and population standard deviation is 14?

14. Explain about the correlation and simple regression model.

KATHMANDU UNIVERSITY
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28-jan-025

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SECTION "A"

[20 Q. × 1 = 20 marks]

Choose and encircle in the most appropriate option from each set of choices

1. Which one is photosynthetic prokaryotes?
   a. Spirogyra b. Chlorella c. Spirulina d. All of the above

2. All of the given bacteria are gram positive except:
   a. Staphylococcus aureus b. Bacillus anthracis
   c. Helicobacter pylori d. Staphylococcus pneumoniae

3. Exotoxins are
   a. Proteins b. Polysaccharide c. Steroids d. Lipids

4. Net ATP produced in glycolysis is:
   a. 1 b. 8 c. 4 d. 2

5. Which one is **WRONG** about motor protein:
   a. Kinesisn and Dyneins move along microtubules,
   b. Myosins move along microfilaments.
   c. Dyneins movement is from the (+) end of the microtubule to the (-) end
   d. Kinesin movement is from the (+) end of the microtubule to the (-) end

6. Which ions are present in higher concentrations outside the cell?
   a. Sodium & Potassium b. Chloride & Sodium
   c. Potassium & Chloride d. Sodium, Potassium & Chloride

7. Which one is **INCORRECT**:
   a. In tight junction, the cell membranes are connected, and the contents can move from one cell to another.
   b. Communicating junctions establish direct physical connections that link the cytoplasms of two cells together, permitting small molecules or ions to pass from one to the other.
   c. Gap junctions provide passageways large enough to permit small substances, such as simple sugars, water, ions and amino acids, to pass from the cytoplasm of one cell to that of the next, yet small enough to prevent the passage of larger molecules such as proteins.
   d. Hemidesmosomes anchor epithelial cells to a basement membrane (extracellular matrix).

8. **Axoneme** of cilia found in the airways and lungs have following arrangement of microtubule
   a. 9 + 0 b. 9 + 1 c. 9 + 2 d. 9 + 3

9. Which one is **WRONG** about Euchromatin and Heterochromatin?
   a. Heterochromatin is a highly condensed/tightly packed region of DNA.
   b. Heterochromatin is transcriptionally active.
   c. Euchromatin is a delicate, less condensed region of DNA.
   d. Euchromatin is transcriptionally active.

10. Which one is **TRUE** about membrane protein and phospholipid
    a. They are dynamic in nature
    b. Their lateral movement is restricted.
    c. They can move back and forth (flip-flop) easily.
    d. When two cells fuse, the proteins in their cell membrane will not mix over the cell surface.

11. Which type of intermediate filament is present in muscle?
    a. Keratin b. Desmin c. Lamin d. Vimentin

12. During the electron transport chain reaction in mitochondria, which one is **CORRECT**?
    a. Protons are pumped towards the matrix by complex I, III and IV.
    b. The source of energy for ATP synthesis is the electrochemical gradient of OH^- ion.
    c. Oxygen is generated in the last step of the ETC reaction.
    d. Protons are pumped toward the intermembrane space by complex I, III and IV.

13. Subunit of 70S ribosomes are:
    a. 30S and 50S b. 40S and 50S c. 20S and 50S d. 30S and 40S

14. Actin is the structural unit of
    a. Microfilament b. Cell membrane c. microtubule d. intermediate filament

15. Ribosome is not present in.
    a. Rough endoplasmic reticulum b. Chloroplast
    b. Mitochondria d. Vacuole

16. How many pairs of centrioles are there in the anaphase stage of mitosis?
    a. 6 b. 4 c. 2 d. 1

17. Write the **CORRECT** order for the Solenoid model of packaging of DNA
    a. DNA → nucleosome → solenoid → chromatin fiber → chromatid → chromosome
    b. DNA → solenoid → nucleosome → chromatin fiber → chromatid → chromosome
    c. DNA → nucleosome → solenoid → chromatid → chromatin fiber → chromosome
    d. DNA → nucleosome → chromatid → chromatin fiber → solenoid → chromosome

18. Humans have 700 times more DNA than E. coli. On this basis select the correct statement
    a. Humans have 700 times higher genes than E. coli
    b. Humans have 700 times higher protein than E. coli.
    c. Humans have 700 times higher RNA than E. coli.
    d. Human DNA content is 700 times more than that of E. coli

19. Haploid mitotic cells are found in all of them except:
    a. Fungi b. Plant gametophyte
    c. Male bees d. Human gametophyte

20. Which compound helps to maintain fluidity in the cell membrane?
    a. Flavonoid b. Terpenoid c. Glycerol d. Cholesterol

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28-Jan-2025

Course : BIOL 102
Semester : II
F. M. : 55

Check (√) the number of each question you have answered in the front page of main answer book (of Sections B, C and D).

SECTION "B"

[5 Q. × 3 = 15 marks]

Attempt ANY FIVE questions.

1. What do you mean by adipose tissue? Write its two major functions. Write its types. [1+1+1]
2. Write about carotenoids and anthocyanins. [1.5+1.5]
3. Elaborate three points which illustrate that prokaryotes are very essential for us with example for each. [3]
4. Write short notes on fission and fusion of mitochondria. [3]
5. Explain nuclear lamina with its functions. [3]
6. On what condition Glucose is converted to lactate in our body? Define fermentation. Give the equation for glycolysis showing the quantity of reactant and products (ATP, NADH, water, hydrogen ion and Pyruvate). [0.5+0.5+2]
7. Define tight junction with a figure. Write two major functions of tight junctions. [1+2]

SECTION "C"

[5 Q. × 5 = 25 marks]

Attempt ANY FIVE questions.

8. Write the process of asexual reproduction of prokaryotes with diagram. Why gram-positive bacteria retain gram stain even after washing with alcohol? [3+2]
9. What is RNA translation? Describe the process of protein synthesis with diagrams. [1+4]
10. Mention the type of proteins present in the plasma membrane and explain them with suitable figures. [5]
11. Mention the four signaling pathway and explain the two signaling pathway with examples. [1+2+2]
12. Define Karyotype? Give four features of human karyotype. Write two major advantages or applications of karyotype in detail. [1+2+2]

P.T.O.

13. Write about the prometaphase stage of mitosis along with four steps for the formation of metaphase plate. [5]

14. Having more content of DNA does not mean that there is higher number of gene. Similarly, lesser DNA content doesn't mean lesser gene. Justify the statements. [5]

SECTION "D"

[2 Q. × 7.5 = 15 marks]

Attempt ANY TWO questions.

15. Membrane proteins and phospholipids are unable to move back and forth (flip-flop). Discuss it by giving a suitable experimental report provided by Larry Frye and Michael. Discuss the mechanism of cell lysis by using detergent with figures. Discuss the role of cholesterol in cell membrane. [2+4+1.5=7.5]

16. Write the four major chemical components of chromosomes. Describe the proteins found in chromosome. Illustrate giant chromosomes with example. Write two advantages of giant chromosomes. [1+3+1.5+2=7.5]

17. Write about the three passive diffusion process by which movement of substance occurs through the plasm membrane (Provide figure also). What do you mean by active transport of substance across the plasma membrane? Explain with a figure, how glucose is transported from the lumen of intestine into the intestinal epithelial cells. [3+1.5+3=7.5]

KATHMANDU UNIVERSITY
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January/February, 2025

Marks Scored:

Level : B.Pharm.
Year : I

Course : COMP 117
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date :

SECTION "A"

[20 Q. × 1 = 20 marks]

Choose and encircle in the most appropriate option from each set of choices

1. Which character is used in Python to make a single line comment?
   [ ] / [ ] # [ ] // [ ] !

2. What is an algorithm?
   [ ] A type of programming language.
   [ ] A tool used to debug code.
   [ ] A kind of software used to compile code.
   [ ] A series of steps designed to solve a problem or complete a task.

3. Which of the following is the correct extension of the Python file?
   [ ] .pyt [ ] .p [ ] .py [ ] .pn

4. What is the default data type of the value returned by the input() function in Python?
   [ ] int [ ] str [ ] float [ ] list

5. Which of the following Python statements is used to display the output to the screen?
   [ ] input() [ ] print() [ ]output() [ ]display()

6. Which symbol is used in a flowchart to represent a decision or a conditional operation?
   [ ] Rectangle [ ] Oval [ ] Parallelogram [ ] Diamond

7. Which of the following is a valid variable name in Python?
   [ ] 1variable [ ] variable_1 [ ] variable-1 [ ]@variable

8. What is the output of the following code?

```
message = "Hello, World!"
print(message[0:5])
```

   [ ] Hello [ ] World [ ] Hello, [ ] Error

9. Which of the following is NOT an assignment operator in Python?
   [ ] = [ ] += [ ] *= [ ] ==

10. Which data type is used to store a collection of items, where each item is indexed by a key?
    [ ] List [ ] Tuple [ ] Set [ ] Dictionary

11. Which of the following is not a method available for lists in Python?
    [ ]append [ ] reverse [ ] pop [ ] set

12. Which of the following is a mutable data type in Python?
    [ ] String [ ] Tuple [ ] List [ ] Integer

13. What does the if-else statement do in Python?
[ ] Executes the code block only if the condition is False
[ ] Executes one block of code if the condition is True, and another if the condition is False
[ ] Executes one block of code regardless of the condition
[ ] Only compares values

14. Which of the following is the correct syntax for an if statement in Python?
[ ] if (x > 10) [ ] if x > 10: [ ] if x > 10 then [ ] if x > 10 do:

15. What will the following code print?

```
x = 10
if x < 5:
   print("Small")
elif x > 5:
   print("Large")
else:
   print("Medium")
```

[ ] Small [ ] Large [ ] Medium [ ] None

16. Which of the following statements can be used to skip an iteration of a loop and continue with the next one?
[ ] continue [ ] break [ ] pass [ ] exit

17. What will the following code output?

```
for i in range(2, 10, 2):
   print(i, end= " ")
```

[ ] 2, 4, 6, 8 [ ] 1, 3, 5, 7, 9
[ ] 2, 4, 6, 8, 10 [ ] 1, 2, 3, 4, 5, 6, 7, 8, 9

18. What is the correct syntax to define a function in Python?
[ ] def function_name { } [ ] function_name = def() { }
[ ] def function_name(): [ ] function function_name():

19. What is recursion in programming?
[ ] A function that calls another function. [ ] A function that calls itself.
[ ] A function that cannot return a value. [ ] A function that never stops.

20. What is Matplotlib primarily used for?
[ ] Machine learning [ ] Data visualization
[ ] Web scraping [ ]Numerical computations

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Level : B.Pharm.
Year : I
Time : 2 hrs. 30mins.

Course : COMP 117
Semester : II
F. M. : 40

SECTION "B"
[6 Q. × 4 = 24 marks]

Attempt ANY SIX questions.

1. What is a flowchart? Design a flowchart to input two numbers from the user and display the largest of the two numbers. [1+3]

2. Define Comments. What are Keywords? List out the rules to define an identifier. [1+1+2]

3. What are the arithmetic and comparison operators available in Python? Explain each operator with an example. Write a Python program to demonstrate the use of these operators.

4. Provide a brief definition of Matplotlib and NumPy. How is SciPy related to NumPy? [3+1]

5. Define break in Python? What is an if-else statement? Write a Python program that takes a number as input and checks whether the number is positive, zero, or negative. [1+1+2]

6. Describe the for loop in Python and how it can be used with the range() function. Write a Python program using a while loop to print the numbers from 1 to 5. [2+2]

7. What are global and local variables in Python? Explain the difference between them with examples. Write a recursive Python program to calculate the factorial of a given number n, where n is provided as input by the user. [2+2]

SECTION "C"
[2 Q. × 8 = 16 marks]

Attempt ANY TWO questions.

8. What is a function in Python? Explain the different categories of functions based on their arguments and return types, with examples.
Write a Python program that asks the user to enter 10 numbers and stores them in a list. Then, the program should display the following options:

   a. Calculate the sum of the numbers.
   b. Find the highest number in the list.

   The user should be prompted to choose one of these options by entering either "a" or "b". Based on the user's choice, the program should perform the selected calculation and display the result.

   Note: Implement user-defined functions to handle the calculations for the sum and the highest number. [1+4+3]

P.T.O.

9. Explain Lists, Tuples, Sets, and Dictionaries in Python. For each data type, describe their key methods and illustrate their usage with examples.

10.

a. What is a loop? Write a program for the following pattern. [4]

```
* * * * *
* * * *
* * *
* *
*
```

b. What is an Algorithm and Exception Handling? Write a Python program that prompts the user to enter a number and determines whether the number is **odd** or **even**. [4]

KATHMANDU UNIVERSITY
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Marks Scored:

Level : B.Pharm.
Year : I

04 FEB 2025

Course : CHEM 203
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date : 04 FEB 2025

SECTION "A"

[20 Q. × 1 = 20 marks]

Choose and mark [X] in the most appropriate option from each set of choices.

1. A hexapeptide made from the repeating unit of Gly-Arg has
   [ ] free amino group on Gly and free carboxyl group on Arg, 5 amide bonds.
   [ ] free amino group on Gly and free carboxyl group on Arg, 6 amide bonds.
   [ ] free amino group on Arg and free carboxyl group on Gly, 5 amide bonds.
   [ ] free amino group on Arg and free carboxyl group on Gly, 6 amide bonds.

2. Which of the following are the correct statements considering pyrrole (A) and pyridine (B)?
   i. A is less basic compared to B.
   ii. A undergoes electrophilic aromatic substitution more readily than B.
   iii. Electrophilic aromatic substitution in A and B takes place at 2 and 3 position respectively.
   [ ] i and ii [ ] ii and iii [ ] i and iii [ ] i, ii and iii

3. Which of the following compounds is not an organometallic compound?
   [ ] *n*-Butyllithium [ ] C_2H_5ONa [ ] $C_2H_5ZnC_2H_5$ [ ] R-C≡CNa

4. The reaction of furan with acetic anhydride is
   [ ] electrophilic substitution that takes place at 2 position
   [ ] electrophilic substitution that takes place at 3 position
   [ ] nucleophilic substitution that takes place at 2 position
   [ ] nucleophilic substitution that takes place at 3 position

5. 19 Substitution in the general skeleton of a steroid is made at_____ring.
   [ ] A and B [ ] B and C [ ] C and D [ ] Only at D

6. Aldonic acid is _____derivative of aldose.
   [ ] monocarboxylic acid [ ] dicarboxylic acid
   [ ] uronic acid [ ] aldehydo acid

7. Which of the following statement is correct?
   [ ] Maltose is made from glucoses with β linkage.
   [ ] Lactose is made from glucoses with β linkage.
   [ ] Cellulose is made from glucoses with β linkages.
   [ ] Amylose is made from glucoses with β linkage.

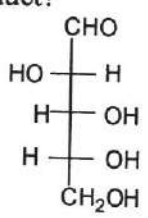
8. A Witting reaction with formaldehyde will produce
   [ ] a primary alcohol. [ ] a secondary alcohol.
   [ ] a larger aldehyde. [ ] a terminal alkene.

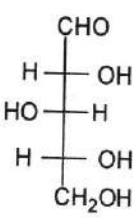
9. During crossed aldol condensation, $CH_3COOC_2H_5$ cannot be reacted with_____.
[ ] $Ph\text{-}COOC_2H_5$ [ ] $CH_3CH_2COOC_2H_5$
[ ] $HCOOC_2H_5$ [ ] $C_2H_5\text{-}O\text{-}CO\text{-}O\text{-}C_2H_5$

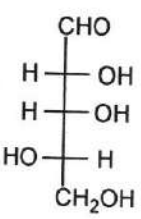
10. For the cycloaddition reaction where the number of π electrons involved is 8, the thermal reaction occurs in_____mode.
A. antara, antara B. antara, supra C. supra, antara D. supra, supra
[ ] A and B [ ] B and C [ ] C and D [ ] A and D

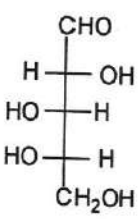
11. Which of the flowing statement is wrong regarding sigmatropic reaction?
[ ] [1,9] migration of H is suprafacial.
[ ] [1,5] migration of H occurs readily compared to [1,3].
[ ] [1,5] migration of C occurs with inversion of configuration.
[ ] For larger π frameworks, both supra and antara shifts should be possible.

12. Which of the following when reacted with dilute nitric gives an optically inactive product?

[ ] 

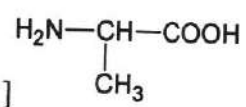
[ ] 

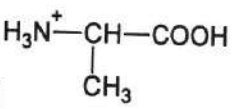
[ ] 

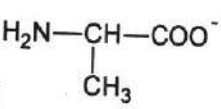
[ ] 

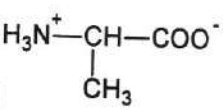
13. Edman degradation method starts with _____and reacts with _____functional group in a peptide.
[ ] 2,4-dinitrofluorobenzene; free amino
[ ] 2,4-dinitrofluorobenzene; free carboxylic acid
[ ] phenyl isothiocyanate; free amino
[ ] phenyl isothiocyanate; free carboxylic acid

14. Which of the following structure represent alanine in a solution of pH 10?

[ ] 

[ ] 

[ ] 

[ ] 

15. The acetoacetic ester synthesis gives _____ as a product in which one hydrogen has been replaced by alkyl groups.
[ ] monosubstituted alcohol [ ] monosubstituted aldehyde
[ ] monosubstituted ketone [ ] monosubstituted carboxylic acid

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Fill in the blanks with appropriate words/symbols.

16. Reaction of one mole of glucose with 3 moles of phenylhydrazine yields _____ _____ (write structural formula).

17. The main product of the reaction between methyl magnesium bromide with ethyl acetate followed by acid work up is_____.

18. During the polymerization of polypropylene, if the methyl group alternate regularly, it is called _____.

19. During the biosynthesis of fatty acid, acetoacetyl-S-ACP is first converted to _____ _____ with the help of $NADPH/H^+$.

20. The monomers of glyptal polymer are _____.

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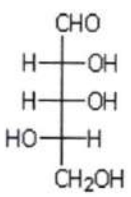
Course : CHEM 203
Semester : II
F. M. : 55

SECTION "B"
[55 marks]

Attempt ALL questions.

1. Give the mechanism for the following reactions. [5 ×2 = 10]
   a. Polymerization of styrene in presence of peroxide
   b. Synthesis of CH_3CH_2COOH staring with malonic ester
   c. Thermal cyclization of butadiene
   d. 2 CH_3COCH_3 in presence of aqueous NaOH
   e. $H_3C—C\equiv CMgBr + CH_3CHO$

2. Explain the following statements (***ANY FIVE***). [5 × 2 = 10]
   a. Electrophilic substitution in pyridine occurs less easily than in benzene.
   b. (+) Sucrose is non-reducing sugar.
   c. [2+2] Cycloaddition reactions occur readily in photochemical condition.
   d. Structure of polymers can be explained by considering entropy and enthalpy.
   e. Kiliani-Fischer synthesis generates epimers.
   f. Enzymatic action of α chymotrypsin is pH dependent.

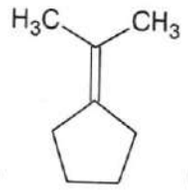
3. Give the chemical reactions involved in the following processes ***(ANY SIX)***. [6 × 2 = 12]
   a.  + H_2/Ni followed by acetylation
   b. Conversion of aldopentose to aldotetrose
   c. Preparation of amino acid by phthalimidomalonic ester method
   d. Boc (*tert.* Butyloxycarbonyl) anhydride with methyl amine followed by HBr in acetic acid
   e. Lauryl alcohol with H_2SO_4 followed by aqueous NaOH
   f. Cationic and anionic polymerization
   g. 2 $CH_3CH_2COOC_2H_5$ in presence of C_2H_5OH/NaOH

4.
   a. What happens when pyridine is treated with H_2/Pt? Compare the basicity between double and triple bonded compounds. [2]

P.T.O.

b. Discuss the acidity of α hydrogen in CH_3-CO-CH_2-$COOC_2H_5$. What type of reactions is favored by it? [2]

c. Considering Wittig reaction, how can you prepare the following two compounds? [2]



(i) (ii) Ph-CH=CH-PH

d. 2-Ketohexose reacts with HCN to give A which on hydrolysis gives B. The reaction of B with HI/heat yields C. Identify A, B and C showing necessary chemical equations. [2]

e. Write down the chemistry of phospholipid mentioning its role in cell membrane. [2]

f. How can the chain length of amylose be determined? [3]

OR

How can you prove that [1,3] sigmatropic shift of hydrogen is not common but [1,5] occurs? Show it with the help of detailed reactions.

5. Write short notes on (***ANY FOUR***). [4 × 2.5 = 10]

a. Synthesis of peptides
b. Chemistry and quality of soap
c. Cycloaddition reactions
d. Coordination polymerization
e. Nucleophilic substitution in pyridine

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Time: 30 mins.

F. M. : 20

Registration No.:

Date : 06 Feb 2025

SECTION "A"

[20 Q. × 1 = 20 marks]

Choose and encircle in the most appropriate option from each set of choices

1. Which one is not the method of dry heat sterilization
   a. Pasteurization b. Incineration c. Hot air oven d. Red hot

2. Select the right method for sterilizing hospital waste:
   a. Red heat b. Flamming c. Incineration d. Infrared Radiation

3. Actinomycetes are:
   a. Fungi b. Algae c. Bacteria d. Cyanobacteria

4. Select the false statement about sterilization at a temperature above 100 °C.
   a. Efficient sterilizing agent than hot air
   b. Increased pressure increases the boiling point of water
   c. Under pressure, steam penetrates more deeply
   d. Water at 100°C has more heat than pressurized steam at the same temperature.

5. Select the non-ionizing radiation
   a. UV b. X-rays
   c. Gamm (γ)-radiation d. X-rays and UV

6. The main mechanism for inactivation of microorganisms in Ultra high-pressure technique is:
   a. Oxidation of major metabolites and proteins
   b. Pressure-induced leakage of intracellular content
   c. Toxicity
   d. Heat-induced damage of protein, enzymes and nucleoprotein

7. Select the false statement about actinomycetes:
   a. Actinomycetes are filamentous bacteria
   b. Actinomycetes are branched
   c. They are unicellular bacteria
   d. They are gram-negative bacteria

8. Which one is true about sterilization
   a. For the sterilization method, the probability of a viable organism on a product after sterilization can be zero.
   b. 100 % Sterility Assurance level (SAL) for a sterilization technique is possible
   c. SAL is not a quantitative value.
   d. SAL can never be 100 % but can be reduced to very low numbers

9. Select the false statement
   a. Antibiotics like penicillin will kill mycoplasma.
   b. Mycoplasma are the smallest free-living organisms.
   c. Mycoplasma have no cell wall around their cell membrane.
   d. One of the major diseases caused by mycoplasmas is pneumonia.

10. Term vaccine was coined by
   a. Robert Koch b. Pasteur c. Needham d. None of these

11. All of the following are true about agar except it
   a. Is a polysaccharide derived from a red alga
   b. Solidifies at approximately 40°C
   c. Is metabolized by many bacteria
   d. Facilitates obtaining pure cultures

12. Endospores can be stained with
   a. Safranine b. Malachite green c. Crystal violet d. Methylene blue

13. Which media are typically used in sterility testing?
   a. Nutrient agar and Sabouraud dextrose agar
   b. Fluid thioglycollate medium and soybean-casein digest medium
   c. MacConkey agar and blood agar
   d. Trypticase soy broth and Mueller-Hinton agar

14. What does the calibration curve in a microbiological assay represent?
   a. The microbial growth rate over time
   b. The relationship between antibiotic concentration and microbial inhibition
   c. The optical density of the medium at different times
   d. The amount of drug absorbed by microorganisms

15. Air flow velocity can be monitored by
   a. Sling Psychrometer b. DOP smoke
   c. Magnehelic gauge d. Anemometer

16. The production of acetyl methyl carbinol from pyruvic acid is checked by
   a. Indole test b. MR test c. VP test d. H2S test

17. The ideal properties of disinfect include all except:
   a. should be non-toxic and non-corrosive b. should be stable
   c. should be volatile d. should be potent

18. In the turbidimetric method, what parameter is primarily measured?
   a. Light density of the culture medium b. The size of the inhibition zone
   c. Color change in the medium d. The concentration of nutrients in the medium

19. What is the primary purpose of a microbiological assay?
   a. To determine the sterility of a sample b. To assess the potency of antibiotics or vitamins
   c. To measure microbial contamination d. To identify specific microorganisms

20. What type of immunity is conferred by the administration of antitoxins?
   a. Active natural immunity b. Passive natural immunity
   c. Active artificial immunity d. Passive artificial immunity

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Check (√) the number of each question of Section B, C and D you have answered in the front page of main answer book.

SECTION "B"

[5 Q. × 3 = 15 marks]

Attempt ANY FIVE questions.

1. Outline the different types of microscopes.
2. Explain the Indole test and Voges-Proskauer Test [VP-Test].
3. State the general principle on Endospore Staining of bacteria.
4. Differentiate between selective media and differential media.
5. Write about performance qualifications.
6. Write about tyndallization and pasteurization?
7. What kind of organism are actinomycetes? How are they important to medical science and agriculture? Write about its mode of nutrition.

SECTION "C"

[5 Q. × 5 = 25 marks]

Attempt ANY FIVE questions.

8. What is death rate curve? Explain D value on the basis of death rate curve. Define Z value with its significances. [1+2+2]
9. Explain antibiotic resistance (ABR) with a suitable example? What are the reasons for the increase in ABR in Nepal? [2+3]
10. Write about the causative agent of syphilis? How is it spread? What are the treatment strategies for syphilis? [1.5+1.5+2]
11. Define antiseptic, disinfectant and preservative with examples. How can the Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) be determined? [2.5+2.5]
12. Outline the particle and microbial limit criteria for a cleanroom in Class 100 and Class 100,000. How should walls, ceilings, and equipment be considered during cleanroom construction? [2.5+2.5]

13. Differentiate between streak culture and stab culture. Describe the culture method using GASPAK for anaerobic bacterial culture. [2+3]

14. What is the principle of sterility test? Explain the importance of positive and negative controls in the test. State the criteria for result interpretation in a sterility test. [1+2+2]

SECTION "D"

[2 Q. × 7.5 = 15 marks]

Attempt ANY TWO questions.

15. What are the causative agents of enteric fever and AIDS? Describe the Widal test for the diagnosis of enteric fever. What are the three symptoms which are known to be AIDS related complex (ARC)? Give four major modes of transmission for AIDS. Protease inhibitor is a type of drug used in AIDS. Mention its mechanism of action. [1+2+1.5+2+1]

16. Differentiate between active and passive immunization. Discuss the immunological products used for active and passive immunization. Share your opinion on the COVID-19 vaccine. [2.5+2.5+2.5]

17. Define pyrogen. Compare the SHAM test and the LAL test. Describe the procedure and interpretation of the SHAM test. [1+2.5+4]

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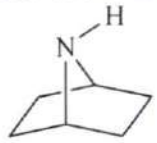
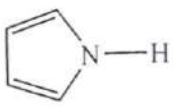
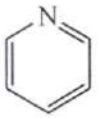
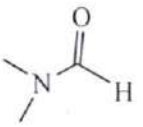
Registration No.: 17 FEB 2025 Date :

SECTION "A"
[20 Q. × 1 = 20 marks]

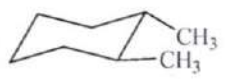
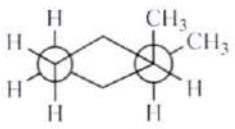
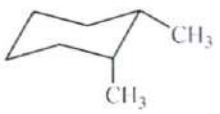
Choose and encircle in the most appropriate option from each set of choices

1. Which of the following structures exhibits an sp3-hybridized nitrogen atom?

[ ]  [ ]  [ ]  [ ] 

2. Which is the correct order of priority according to CIP rule to assign configuration?
[ ] –H > -CH_3 > -Cl > -CHO [ ] –Cl > -CHO >–CH_3 > -H
[ ] -Cl > –CH_3 > -CHO > -H [ ] –CHO > –Cl >–CH_3 > -H

3. All of the following are representations of cis-1,2-dimethylcyclohexane EXCEPT……

[ ]  [ ]  [ ]  [ ] 

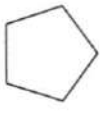
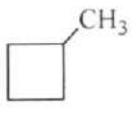
4. A sample of 2-bromobutane has a specific rotation of +11.55. What is the approximate % of (+)-isomer in the sample? Given specific rotation of optically pure (R)-(-)-isomer is -23.10.
[ ] 20% [ ] 50% [ ] 75% [ ] 90%

5. Which mechanism involves a carbocation electrophile reacting with a weak nucleophile?
[ ] E1 [ ] E2 [ ] S_N1 [ ] S_N2

6. Potassium tertiarybutoxide (*t*-BuOK) is a suitable reagent to promote which mechanism/s?
I. **S_N1** II. **S_N2** III. **E1** IV. **E2**
[ ] I and II [ ] I and III [ ] II and IV [ ] III and IV

7. Which of the following aromatic compounds is the most reactive toward Nitration?
[ ] Toluene [ ] Nitrobenzene [ ] Chlorobenzene [ ] Phenol

8. Which is expected to have the largest heat of combustion?

[ ]  [ ]  [ ]  [ ] 

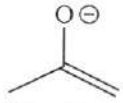
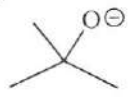
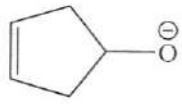
9. Which of the following statements is false about enantiomers?
[ ] rotate plane-polarized light [ ] are superimposable mirror images
[ ] are nonsuperimposable mirror images [ ] have the same melting point

10. Which of the following compounds may be classed as a polar aprotic solvent
[ ] N, N-Dimethylformamide [ ] Carbontetrachloride
[ ] Dichloromethane [ ] Diethylether

11. For a chiral substrate which of the following reaction mechanism is accompanied by inversion of configuration?
[ ] S_N1 [ ] S_N2 [ ] E1 [ ] E2

12. Nitration of toluene followed by oxidation with $KMnO_4$ yields..... as a major product.
[ ] o-nirtobenzoic acid [ ] m-nitrobenzoic acid
[ ] a mixture of o and p-nitrobenzoic acid [ ] m-nitrotoluene

13. Which of the following anions is resonance delocalized?

I  II  III 

[ ] I only [ ] II only [ ] I and III [ ] III only

14. Which compound below can react with two moles of alcohols to give an acetal?
[ ] Benzene [ ] Propanone [ ] Toluene [ ] Cyclohexene

15. How many stereoisomers are possible for a molecule of 2,3-dibromobutan-1-ol.
[ ] 1 [ ] 2 [ ] 3 [ ] 4

Fill in the blank.

16. Among the four conformations of n-butane, the most stable conformation is _____ conformation.

17. An electron withdrawing substituent at *ortho* or *para* position _____ reactivity of the benzene ring toward *electrophilic aromatic substitution.*

18. *Dehydrohalogenation* of 2-chlorobutane produces _____ as a major product.

19. Hoffmann elimination generally yields _____ substituted _____ as a major product.

20. Reaction of chlorobenzene with strong base such as sodium amide in ammonia undergoes nucleophilic aromatic substitution to give aniline. The mechanism of this reaction is elimination-addition mechanism which is also known as _____ mechanism.

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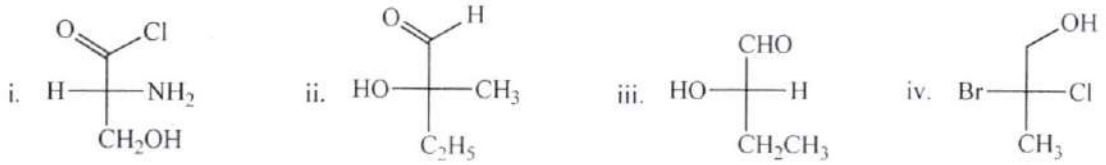
SECTION "B"

Attempt ALL questions.

1.

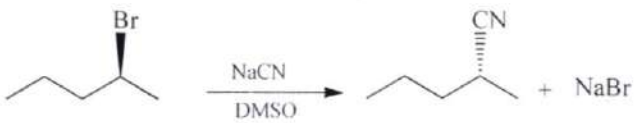
a. Write an example of each of the following name reactions. [3]
i. Fries rearrangement ii. Michael addition iii. Aldol condensation

b. Identify the R, S, configuration of the chiral center in each of the following compounds. [2]



2.

a. Consider the following substitution reaction.



i. Determine whether this reaction proceeds via an S_N1 or S_N2 process, and propose a complete mechanism [2]
ii. What is the expected rate equation for this process? [1]
iii. Would the process occur at a faster rate if the concentration of cyanide was doubled? [1]
iv. Draw an energy diagram for this process [2]

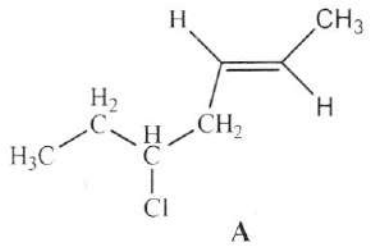
b. Explain the conformational analysis of cyclohexane. [4]

3. Give the appropriate reasons (*ANY SIX*) [2 × 6 = 12]
i. Cyclobutane is less stable than cyclopentane
ii. Neopentyl bromide undergoes nucleophilic substitution by S_N1 mechanism
iii. α-hydrogen is more acidic than other hydrogens in propanal.
iv. –Cl is a deactivating group for electrophilic aromatic substitution but ortho-para director.
v. Gauche conformation of n-butane is less stable than anti conformation.
vi. Cyclopentadienyl anion forms faster than cyclopentadienyl cation.
vii. Order of stability of free radicals is *tertiary* > *secondary* > *primary*.
viii. Generation of second chiral center yields diastereomers in unequal amounts.

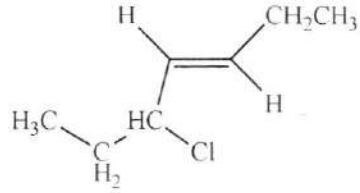
P.T.O.

4. Write short notes on *(**ANY THREE**)* [3 × 3 = 9]
   i. Resonance
   ii. Resolution
   iii. Conformational analysis of n-butane
   iv. Cahn-Ingold-Prelog (CIP) rule

5.
   a. The following isomers do not differ greatly in stability. Predict which one should react more rapidly in an S_N1 solvolysis reaction in aqueous acetone. Explain. [4]

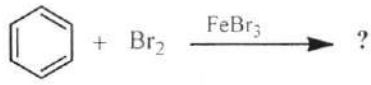


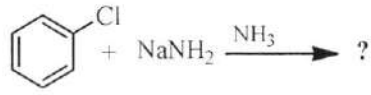
A

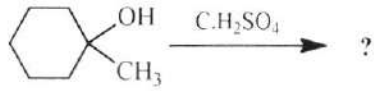


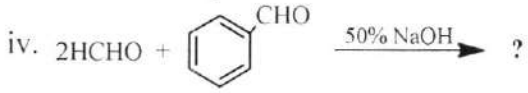
B

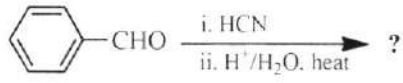
6.
   a. Give the major product/s for the following reactions. [5]

i. 

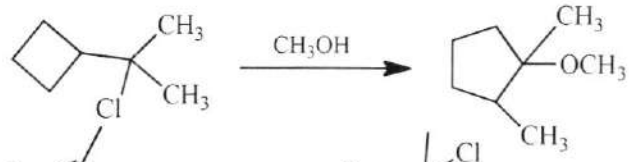
ii. 

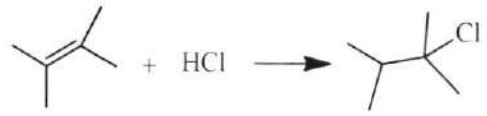
iii. 

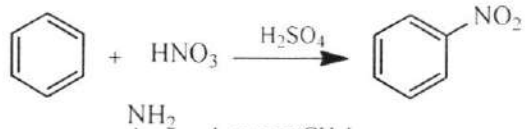
iv. 

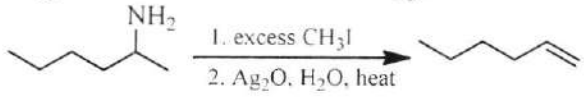
v. 

7. Propose a mechanism for the following reactions. [4 × 2.5 = 10]

i. 

ii. 

iii. 

iv. 

KATHMANDU UNIVERSITY
End Semester Examination
January/February, 2025

Marks Scored:

Level : B.Pharm.
Year : I

16 FEB 2025

Course : PHAR 114
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date :

SECTION "A"

[20 Q. × 1 = 20 marks]

Choose and encircle in the most appropriate option from each set of choices

1. Intra cellular fluid is:
   a. 28L b. 10L c. 14L d. 3L

2. Resting membrane potential is mainly generated due to:
   a. Na+/K+ pump b. Influx of Na+ c. Efflux of K+ d. Efflux of Na+

3. Plasma membrane is mainly composed of:
   a. Cholesterol b. Phospholipids c. Proteins d. Carbohydrates

4. The cell junctions allowing exchange of cytoplasmic molecule between two cells is called:
   a. Tight junction b. Gap junction c. Desmosomes d. Hemi-desmosomes

5. The site where myosin heads bind to actin in skeletal muscles are covered by:
   a. Myosin b. Calcium c. Troponin d. Tropomyosin

6. Thin filament consists of all except:
   a. Actin b. Myosin c. Troponin d. Tropomyosin

7. Sarcomere ends between:
   a. Two I band b. H zone c. A band and I band d. Two Z lines

8. Basic electrical rhythm is produced by:
   a. Smooth muscle at cardiac end of stomach
   b. Antral G cell
   c. Myenteric plexus
   d. Interstitial cells of Cajal

9. Maximum potassium ions secretion is seen in:
   a. Gastric secretion b. Jejuna secretion c. Saliva d. Colonic secretion

10. Maximum contraction of gall bladder is seen with::
    a. Gastrin b. Secretin c. CCK d. Glucagon

11. Vitamin B12 is absorbed in::
    a. Stomach b. Jejunum c. Duodenum d. Terminal ileum

12. Pacemaker cell of heart is:
a. AV node b. Bundle of His c. Purkinje fibers d. SA-node

13. Speed of conduction is fastest in:
a. Purkinje system b. SA node c. AV node d. Bundle of his

14. QRS complex indicales:
a. Ventricular depolarization b. Ventricular repolarization
c. Atrial depolarization d. Atrial repolarization

15. Normal intrapleural pressure at the start of inspiration is:
a. -7 b. -5 c. -2 d. -4

16. Pulmonary surfactant is secreted by:
a. Type I pneumocytes b. Type II pneumocytes
c. Clara cells d. Bronchial epithelial cells

17. Pacemaker cell of respiratory system is:
a. Pre-Botzinger colplex b. Pneumotaxic center
c. Apneustic center d. Dorsal respiratory group

18. Each hemoglobin molecule carries how many molecules of oxygen?
a. 2 b. 4 c. 8 d. 6

19. Total leucocyte count is:
a. 2000/cumm b. 15000-20000/cumm
c. 4000-11000/cumm d. 20000-30000/cumm

20. Constriction of blood vessel following injury is due to:
a. Anoxia b. Serotonin c. Endothelin d. Prostacyclin

KATHMANDU UNIVERSITY
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16 FEB 2025

Course : PHAR 114
Semester : II
F. M. : 55

Give the answers with figures, graphs or flowcharts wherever appropriate.

SECTION "B"
[5 Q. × 3 = 15 marks]

Attempt ANY FIVE questions. Explain with graphs and figures where ever required

1. Differentiate between active and passive transport.
2. What is myasthenia gravis?
3. What are the functions of plasma proteins?
4. What are the functions of cholecystokinin on gall bladder, pancreas and gastric emptying?
5. Describe the working mechanism of Na+/K+ pump.
6. Describe different lung volumes.
7. Describe the pathway of conduction of impulse in heart with a labeled diagram.

SECTION "C"
[5 Q. × 5 = 25 marks]

Attempt ANY FIVE questions.

8. Describe the phases and ionic basis of action potential with a labeled diagram.
9. Enumerate the steps in neuromuscular transmission.
10. Describe the process of fibrinolytic system.
11. Describe causes and mechanism of vomiting.
12. Describe neural regulation of respiration.
13. Enumerate the functions of liver.
14. What is cardiac output? What are the factors regulating cardiac output?

P.T.O.

SECTION "D"

[2 Q. × 7.5 = 15 marks]

Attempt ANY TWO questions.

15. What is blood pressure? Describe neural and long term hormonal mechanism of regulation of blood pressure.

16. Describe the process of excitation contraction coupling.

17. Describe the mechanism of HCl secretion and factors regulating it.