



BRAINWARE UNIVERSITY

Term End Examination 2022

Programme – B.Sc.(BT)-Hons-2018/B.Sc.(BT)-Hons-2019/B.Sc.(BT)-Hons-2020

Course Name – Bio-mathematics/Bio-Mathematics

Course Code - BBT504C2/BBTD502C

(Semester V)

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

- (i) Identify the species that hunt in packs, such as the African wild dogs, would not be able to locate and capture prey as efficiently in smaller groups. So their population will be reduced due to
- a) Exceeding carrying capacity b) Allee effect
c) Gompertz growth d) All of above
- (ii) Recognize this growth model statement, growth is slowest at the start and end of a given time period, but steeply rises in the middle. Name the model.
- a) Gompertz growth model b) Logistic growth model
c) Malthusian growth model d) All of above
- (iii) Label the common ratio of the series 64, 48, 36, 27,
- a) one forth b) three forth
c) half d) two third
- (iv) Compare disease transmission model, the total population In S-I-R-S ↓.
- a) Decreases with time b) Increases with time
c) Stays constant with time d) Changes with time
- (v) Illustrate In the logistic growth model $P = 1.3P(1 - P/10)$, what values of P will cause P to be negative?
- a) $P=10$ b) $P<10$
c) $P \%10$ d) $P>10$
- (vi) Find out the next number in the sequence: 39, 47, 55, 63,
- a) 70 b) 71
c) 72 d) 73
- (vii) Discover that Epidemiologists are interested in learning about
- a) the causes of diseases b) the frequency and geographic distribution of diseases
c) the causal relationships between diseases d) all of them
- (viii) predict the blank where "Diseases that are always present in a community, usually at a low, more or less constant frequency are classified as having an _____ pattern.

- a) epidemic
c) pandemic
- b) endemic
d) exodemic
- (ix) Choose which of the following statements is true concerning epidemic diseases?
- a) They are usually not very contagious.
c) They usually appear and disappear seasonally.
- b) At the end of an epidemic, a disease spreads at an increasing rate and then abruptly disappears.
d) none of them
- (x) Conclude this: A chemostat is also known as
- a) Bactogen
c) Bacterial filter
- b) Bacteriogen
d) Bacteriogen vessel
- (xi) Chemostat is an explanation of
- a) CSTR
c) Batch reactor
- b) LSTR
d) None of them
- (xii) Evaluate the value of u justifying this "In absence of prey, a predator equation looks like $\dot{Q} = uQ$ [$u =$ per capita death rate].
- a) $u < 0$
c) $0 < u \ll 1$
- b) $u > 1$
d) $u = 0$
- (xiii) Conclude the Monod function:
- a) Monotonically increasing with no limit
c) Monotonically decreasing with no limit
- b) Monotonically increasing with specific limit
d) Monotonically decreasing with specific limit
- (xiv) Infer the logic in a close system bioreactor. There is
- a) No exchange of energy
c) No exchange of concentration
- b) No exchange of mass
d) None of them
- (xv) Formulate $\log(4) + \log(1) = ?$
- a) $\log(4)$
c) $\log(1)$
- b) $\log(3)$
d) $\log(2)$

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Evaluate the Mode value when there is no data occurrence in a data set? (3)
3. Evaluate the median value of an even no data set of 14,2,6,4,12,10,8,16? (3)
4. illustrate the Age Structure Model? (3)
5. Classify the difference between Mass in flow and Mass out flow in Lake pollution Model (3)

OR

- Explain the logical explanation how lake got polluted via classical equation of compartment diagram? (3)
6. write the michales michellis constant equation and introduce the parameters. (3)

OR

- Describe at each time t , $s(t) + i(t) + r(t) = 1$ (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Discuss Spruce Budworm Model with first order differential equation and state some differentiation with Prey predator model. (5)
8. Summarize the Spruce Budworm Model and Mention seven unique characteristics of its? (5)
9. What are the Standard Deviation and Variances, Mention the equations and Introduce the parameters? (5)
10. Analyze the Basic reproduction No with equation and state an event regarding this. (5)
11. Define Probability and describe each types of probability with example? (5)

OR

- Define Decay model and mention its salient features with an equation. (5)
12. Determine the probability of a flipping coin in 12th time and calculate the probability of (5)

getting odd number for a dice and state a definition of stochastic process and give an example.

OR

Determine Covid disease as an Epidemic model and give a diagrammatic view of this. (5)
