

AR18

CODE: 18BST209

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech I Semester Supplementary Examinations, June-2022

BIOLOGY

(Common to CIVIL, CSE & IT)

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Demonstrate an exciting and contemporary aspects of Biology as an independent Scientific discipline (6M)
2. b) Discuss the major discoveries of Biology in recent past and explain them (6M)
- (OR)
3. a) Why we need to study biology and explain the main differences between Science and engineering (6M)
- b) Explain the origin of thermodynamics by referring to the original observations of Robert Brown and Julius Mayor (6M)

UNIT-II

4. a) Define the concept of single celled organisms and explain the ecological aspects of single celled Organisms (6M)
- b) Classify the organisms based on cellularity and also explain the ultra structure of prokaryotes (6M)
- (OR)
5. a) Contrast the differences between prokaryotes and eukaryotes. (6M)
- b) Define the concepts of Microscopy and Growth Kinetics. (6M)

UNIT-III

6. a) Discuss the concept of complementation using human genetics. (6M)
- b) Explain about molecular basis of information regarding DNA as a genetic material. (6M)
- (OR)
7. a) Explain the concepts of dominance and recessiveness, alleles and Gene interaction. (6M)
- b) Demonstrate the hierarchy of DNA structure from single stranded to double helix. (6M)

UNIT-IV

8. a) Discuss the enzyme kinetics and kinetic parameters. (6M)
- b) Classify the enzymes and also discuss the general properties of enzymes. (6M)
- (OR)
9. a) Explain the mechanism of enzyme action with suitable examples. (6M)
- b) Discuss the hierarchy in protein structure and also explain the functions of the proteins. (6M)

UNIT-V

10. a) Define endothermic reaction with glycolysis cycle. (6M)
- b) Enumerate the importance of photosynthesis and respiration in plants. (6M)
- (OR)
11. a) Critically discuss the synthesis of glucose from CO₂ and H₂O through photosynthesis in plants. (6M)
- b) Characterize exergonic reaction and demonstrate Krebs cycle in life. (6M)

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Discuss the terms Joint probability and Conditional probability. 6M
b) One card is drawn from a regular deck of 52 cards.
i) What is the probability of that the card is a Jack. 6M
ii) that card will be a 5 or smaller?

(OR)

2. a) What is sample space? Explain the Discrete sample space and Continuous sample space with suitable example each. 6M
b) An experiment consists of observing the sum of the outcomes when two fair dice are thrown then find i) the probability that the sum is 7 and ii) the probability that the sum is greater than 10. 6M

UNIT-II

3. a) Define Random variable? What is meant by CDF and List out the properties? 6M
b) Explain Gaussian density and distribution function in detail. 6M

(OR)

4. a) For Poisson distribution, prove that variance is equal to λ . 6M
b) A random variable has a probability density, then find i) $E[4X+2]$ ii) $E[X^2]$
 $f_x(x) = \frac{5}{4} (1 - x^4), \quad 0 < x < 1$ 6M

UNIT-III

5. a) If X and Y are independent, show that $E[XY] = E[X] E[Y]$. 6M
b) The joint density function of two random variables X and Y is
 $f_{xy}(x,y) = \begin{cases} \frac{(x+y)^2}{40}, & -1 \leq x \leq 1, -3 \leq y \leq 3 \\ 0, & \text{otherwise} \end{cases}$ then find marginal density functions of x and y. 6M

(OR)

6. a) State and prove central limit theorem? 8M
b) A joint probability density function is $f_{xy}(x,y) = \begin{cases} \frac{1}{24}, & 0 < x < 6, 0 < y < 4 \\ 0, & \text{otherwise} \end{cases}$ Find the expected value of the function $g(x, y) = (XY)^2$. 4M

UNIT-IV

7. a) Define Random Process and classify it. 6M
b) Given the random process by $X(t) = A \cos(\omega_0 t) + B \sin(\omega_0 t)$ Where ω_0 is a constant, and A and B are uncorrelated zero mean random variables having different density functions but the same variance, show that X(t) is wide sense stationary but not strictly stationary. 6M

(OR)

Discuss in detail about:

8. (i) First order stationary random process. 12M
(ii) Second order random process.
(iii) Wide - Sense Stationary Random Process.

UNIT-V

9. a) State and prove any three properties of cross power density spectrum? 6M
b) A random process has the power density spectrum $S_{xx}(\omega) = \frac{6\omega^2}{1+\omega^4}$. find the average power in the process. 6M

(OR)

10. Prove that power spectrum and auto correlation function form Fourier transforms pairs. 12M

AR13

CODE: 13EC2003

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech I Semester Supplementary Examinations, June, 2022

SWITCHING THEORY AND LOGIC DESIGN (Electrical and Electronics Engineering)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) Find the 9's complement number of $(10000)_{10}$
b) Find the 1's complement number of $(1001101.101)_2$
c) $A + AB =$ _____
d) $(x+y)(x+y') =$ _____
e) The number of distinct Boolean expressions of 3 variables is _____
f) How many variables are eliminated when 8-ones are grouped in K-map of 5-variables
g) If A, B and C are the inputs of a full adder then the carry is given by _____
h) How many OR gates are required for an octal-to-binary encoder?
i) A ring counter with 5 flip flops will have states.
j) Write the characteristic equation of JK flip-flop.

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. a) Convert the gray code number 1010000 to the equivalent binary Number [6M]
b) What are Self complementing codes? Give examples. [6M]
3. The message given below has been coded in the Hamming code and transmitted through a noisy channel. Decode the message assuming that at most a single error has occurred in each code word of 7 bits. Assume even parity. [12M]

1 0 0 1 0 0 1 0 1 1 1 0 0 1 1 1 1 0 1 1 0 0 0 1 1 0 1 1

UNIT-II

4. Implement the following functions using AOI logic. [12M]
i. $AB + CD(AB' + CD)$ ii. $AB(BC' + BC)(AC' + AB)$
(OR)
5. a) Obtain the Dual of the following Boolean expressions. [6M]
i. $AB'C + AB'D + A'B'$ ii. $A'B'C + ABC' + A'B'C'D$
b) Find the complement of the following and show that $F.F=0$ and $F+F'=1$. [6M]
 $F = xy' + x'y$

UNIT-III

6. Minimize the the following multiple output functions using K- map. [12M]
 $f1 = \sum m(0, 2, 6, 10, 11, 12, 13)$
 $f2 = \sum m(1, 2, 6, 7, 8, 13, 14, 15)$
(OR)
7. Minimize following function using Tabular minimization. [12M]
 $F(A, B, C, D) = \sum m(6, 7, 8, 9) + \sum d(10, 11, 12, 13, 14, 15).$

UNIT-IV

8. a) Design a full adder circuit using 2 half adders. [6M]
b) Design a 4 bit Parallel adder using full adders. [6M]
(OR)
9. Implement the 8x1 Multiplexer, 16x1 multiplexer [12M]

UNIT-V

10. a) What is excitation table? Write the excitation tables for the following flip-flops. [6M]
i. SR flip-flop ii. JK flip-flop iii. D flip-flop iv. T flip-flop
b) Differentiate in detail the synchronous and asynchronous sequential circuits. [6M]
(OR)
11. Design and draw bidirectional shift register using D flip-flops. [12M]