

Exam Code: 221202 KMV-II [MSE] Paper Code: 2239

Programme: Master of Science (Zoology) Semester- II

Course Title: Biostatistics

Course Code: MZOL-2334

Time Allowed: 3 Hours

Max. Marks: 80

**Note:** Attempt five questions in all, selecting atleast one question from each section. Fifth question may be attempted from any section. Each question carries 16 marks. The students can use only Non-Programmable & Non-Storage Type Calculator and Statistical tables.

**SECTION A**

1. a) Discuss various measures of central tendency along with their significance.

b) A box contains 6 red, 4 white and 5 black balls. A person draws 4 balls from the box at random. Find the probability that among the balls drawn there is at least one ball of each colour.

2. a) The probability that a student passes a Zoology test is  $\frac{2}{3}$  and probability that he passes both Zoology and Botany test is  $\frac{14}{15}$ . The probability that he passes at least one test is  $\frac{4}{5}$ . What is the probability that he passes Botany test?

b) Explain (i) Independent events (ii) Mutually exclusive events  
(iii) Conditional probability (iv) Equally likely events

**SECTION B**

3. a) The diameter of an electric cable, say  $X$ , is assumed to be a continuous variable with p.d.f.  $f(x) = 6x(1-x)$ ,  $0 \leq x \leq 1$

(i) Check that  $f(x)$  is p.d.f. and

(ii) Determine a number 'b' such that  $P(X < b) = P(X > b)$

b) Let  $X$  be a random variable with following probability distribution. Find: (i)  $E(X)$  (ii)  $E(X^2)$  (iii)  $E(2X + 1)^2$

$X$	-3	6	9
$f(x)$	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{3}$

4. Mention the chief characteristics of Normal distribution and Normal probability curve. Also discuss importance of Normal distribution in Statistics.

### SECTION C

5. a) Write a note (i) Karl Pearson's correlation coefficient  
(ii) Spearman's Rank Correlation Coefficient.

b) Calculate the correlation coefficient for the following data

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

6. Obtain the equations of two lines of regression for the following data. Also obtain the estimate of X for Y = 70

X	65	66	67	67	68	69	70	72
Y	67	68	68	65	72	72	69	71

### SECTION D

7. a) Describe the chi-square test of significance and state various uses to which it can be put.

b) The heights of 10 males of a given locality are found to be 70, 67, 62, 68, 61, 68, 70, 64, 64, 66 inches. Is it reasonable to believe that average height is greater than 64 inches. Test at 5% significance level assuming that for 9 degrees of freedom  $P(t > 1.83) = 0.05$ .

8. a) Discuss Analysis of Variance for one-way classified data.

b) Two random samples gave following results. Test whether the samples come from the same normal population at 5% level of significance.

Given  $F_{0.05}(9,11) = 2.90$ ;  $F_{0.05}(11,9) = 3.10$ ;  $t_{0.05}(20) = 2.086$ ;  $t_{0.05}(22) = 2.07$

Sample	Size	Sample mean	Sum of squares of deviation from mean
1	10	15	90
2	12	14	108

**Exam Code: 221202**

**Paper Code: 2239-A**

**Programme: Master of Science (Zoology) Semester- II**

**Course Title: Biostatistics**

**Course Code: MZOL-2334**

**Time Allowed: 3 Hours**

**Max. Marks: 40**

**Note:** Attempt five questions in all, selecting atleast one question from each section. Fifth question may be attempted from any section. Each question carries 8 marks. The students can use only Non-Programmable & Non-Storage Type Calculator and Statistical tables.

**SECTION A**

1. a) Discuss various measures of central tendency along with their significance.

**OR**

b) A box contains 6 red, 4 white and 5 black balls. A person draws 4 balls from the box at random. Find the probability that among the balls drawn there is at least one ball of each colour.

2. a) The probability that a student passes a Zoology test is  $\frac{2}{3}$  and probability that he passes both Zoology and Botany test is  $\frac{14}{15}$ . The probability that he passes at least one test is  $\frac{4}{5}$ . What is the probability that he passes Botany test?

**OR**

b) Explain (i) Independent events (ii) Mutually exclusive events  
(iii) Conditional probability (iv) Equally likely events

**SECTION B**

3 a) The diameter of an electric cable, say  $X$ , is assumed to be a continuous variable with p.d.f.  $f(x) = 6x(1 - x)$ ,  $0 \leq x \leq 1$

(i) Check that  $f(x)$  is p.d.f. and

(ii) Determine a number 'b' such that  $P(X < b) = P(X > b)$

**OR**

b) Let  $X$  be a random variable with following probability distribution.

Find: (i)  $E(X)$  (ii)  $E(X^2)$  (iii)  $E(2X + 1)^2$

$X$	-3	6	9
$f(x)$	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{3}$



4. Mention the chief characteristics of Normal distribution and Normal probability curve.

### SECTION C

5. a) Write a note (i) Karl Pearson's correlation coefficient  
(ii) Spearman's Rank Correlation Coefficient.

**OR**

- b) Calculate the correlation coefficient for the following data

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

6. Obtain the equations of two lines of regression for the following data.

X	65	66	67	67	68	69	70	72
Y	67	68	68	65	72	72	69	71

### SECTION D

7. a) Describe the chi-square test of significance and state various uses to which it can be put.

**OR**

- b) The heights of 10 males of a given locality are found to be 70, 67, 62, 68, 61, 68, 70, 64, 64, 66 inches. Is it reasonable to believe that average height is greater than 64 inches. Test at 5% significance level assuming that for 9 degrees of freedom  $P(t > 1.83) = 0.05$ .

8. a) Discuss Analysis of Variance for one-way classified data.

**OR**

- b) Two random samples gave following results. Test whether the samples come from the same normal population at 5% level of significance.

Given  $F_{0.05}(9,11) = 2.90$ ;  $F_{0.05}(11,9) = 3.10$ ;  $t_{0.05}(20) = 2.086$ ;  $t_{0.05}(22) = 2.07$

Sample	Size	Sample mean	Sum of squares of deviation from mean
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**Section – B**

Question 3. Discuss the various exoskeletal and endoskeleton structures among invertebrates

**Semester-II**

**Course Title: Functional Organization of Animals-II**

**Course Code: MZOL-2481**

**Time Allowed: 3 Hours**

**Max Marks: 80**

**Note: Attempt five questions in all, selecting at least one question from each section (A to D) respectively. Fifth question may be attempted from any section(A to D). Write legibly and Draw well labeled diagrams wherever necessary. Each question carries 16 marks.**

**Section A**

1. Discuss the various adaptive specializations of integument. (16)
2. Explain briefly:
  - (a) Evolution of skin
  - (b) General features of integument (8+8)

**Section-B**

3. Discuss the structure of the Sarcomere and sliding filament theory of muscle contraction. (16)

4. (a) Give the mechanics of swimming in aquatic fauna.  
(b) Explain the physiological advantage of evolution of Appendicular system in Vertebrates. (8+8)

#### **Section-C**

5. Discuss the histology of Adrenal gland along with the physiological functions of its various hormones. (16)
6. Explain the signal transduction pathway for steroidal and non steroidal hormones. (16)

#### **Section-D**

7. (a) Give the different mechanisms for perception of stimuli.  
(b) Explain the special sensory organs for mechanoreception and chemoreception among animals. (8+8)
8. Describe the structure and functioning of additional special sensory organs in Animals. (16)

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**(20)**

**Paper Code: 2237**

**Programme: Master of Science (Zoology)**  
**Semester-II**

**Course Title: Applied Zoology-I (Invertebrates)**

**Course Code: MZOL-2482**

**Time Allowed: 3 Hours**

**Max Marks: 80**

**Note: Candidates are required to attempt 5 questions (each carrying 16 marks) selecting at least one question from each section. The 5<sup>th</sup> question can be attempted from any section.**

**Section A**

1. Write a detailed note on the following
  - a) Life cycle of honey bee.
  - b) Honey composition and quality (8+8)
2. Discuss bee enemies and diseases in detail. 16

**Section B**

3. Explain lac insect species, life cycle and host plants. 16
4. Explain silk moth species and the life cycle along with silk composition and uses. 16

### Section C

5. Discuss the freshwater and marine water prawn farming. 16
6. Discuss the following
  - a) Prawn species
  - b) Spoilage and prevention of prawn
  - c) Processing and preservation of prawn (4+4+8)

### Section D

7. Discuss the following
  - a) Economics of vermiculture
  - b) Species of earthworms used in vermiculture (8+8)
8. What do you mean by pearl culture and discuss the various pearl oyster species in detail. 16



**Exam Code: 221202**

**Paper Code: 2238**

**Programme: Master of Science (Zoology) Semester- II**

**Course Title: Evolution**

**Course Code: MZOL-2483**

**Time Allowed: 3 Hours**

**Max. Marks: 40**

**Note:** Attempt five questions in all, selecting atleast one question from each section (A to D). Fifth question can be attempted from any section. Each question carries 8 marks. Draw diagrams wherever necessary.

**Section A**

- |    |   |   |
|----|---|---|
| 1. | Discuss Biological origin of life.        | 8 |
| 2. | Explain Darwinism with suitable examples. | 8 |

**Section B**

- |    |  |   |
|----|--|---|
| 3. | What is Natural Selection. Discuss its types with suitable examples. | 8 |
| 4. | Explain following:   |   |
|    | a. Industrial Melanism   | 4 |
|    | b. Sexual Selection  | 4 |

**Section C**

- |    |  |   |
|----|--|---|
| 5. | What is continental drift? Discuss the evidences to support Continental drift theory and mechanism of continental drift. | 8 |
| 6. | Explain kinds and causes of major extinctions.   | 8 |

**Section D**

- |    |   |   |
|----|---|---|
| 7. | What is Genetic Drift. Discuss its significance and salient features. | 8 |
| 8. | Write short notes on:   |   |
|    | i. Evolution of Genome in Prokaryotes                                 | 4 |
|    | ii. Evolution of Human  | 4 |

**Note: Attempt FIVE questions in all, selecting at least ONE from each section (A to D). Fifth question can be attempted from any section. All questions carry equal marks (16 marks each). Draw neat & well labelled diagrams wherever necessary.**

**Section-A**

1. Explain Homology and Analogy in favour of organic evolution. 16
2. Write a note on origin of earth. 16

**Section-B**

3. Discuss different types of variations. 16
4. Explain various types of natural selection with suitable examples. 16

**Section-C**

5. What is speciation? Discuss its types with examples. 16
6. What is extinction? Explain extinction of dinosaurs. 16

**Section-D**

7. Explain genetic drift with the help of suitable examples. 16
8. Discuss evolution of horse 16