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PG CBCS
M.SC. Semester-IV Examination, 2021
ZOOLOGY
 PAPER: ZOO 401

Full Marks: 40**Time: 2 Hours**

Write the answer for each unit in separate sheet

The figures in the right-hand margin indicate full marks. Candidates are required to give their answers in their own words as far as practicable.

Group-401.1

(Marks: 20)

(ENVIRONMENTAL POLLUTION & MANAGEMENT)

Answer TWO questions of the following:

2X10=20

1. Define bioinvasion. What is invasive alien species? Explain their role in the extinction of native species citing proper examples. What are the different stages of bioinvasion? 1+1+4+4
2. Explain the role of major air pollutants in greenhouse effect and global warming. Comment on the health hazards in humans due to noise pollution. What is photochemical smog? 5+3+2
3. What is point and non-point source pollution? Discuss the role of fertilizers and pesticides in causing water pollution. Define eutrophication. How solid wastes are responsible for soil pollution? 2+3+2+3
4. What are major causes of environmental degradation? How bioindicators are used in cell biology and genetics studies? Write a short note on Narmada Bachao Andolan. 3+3+4

Group-401.2

(Marks: 20)

(BIOSTATISTICS)

Answer TWO questions of the following:

2X10=20

1. (a) Draw a normal distribution curve and indicate the areas under it, to be occupied by (i) $(\text{mean} \pm \sigma)$ and (ii) $(\text{mean} \pm 2\sigma)$ of the variable.

(P.T.O.)

(2)

- (b) Two specific frequencies (f_3 and f_4) are missing in the following frequency distribution. Find out those missing frequencies (given that the average marks of all students was 67.45).

Marks (x_i)	60-62	63-65	66-68	69-71	72-74	Total
Frequency (f_i)	5	18	f_3	f_4	8	100

- (c) Supposed, the proportion of male child birth is 0.49 and that of female child birth is 0.51 in a population. A freshly married couple decides to have four children in the future. What is the probability of getting at least one male child among the four by that couple? 2+4+4

2. (a) Distinguish between type-I and type-II statistical errors with examples.

- (b) Calculate the correlation coefficient between the two variables 'x' and 'y' from the following data:

x_i	-3	-2	-1	1	2	3
y_i	9	4	1	1	4	9

Does the data indicate that x and y are independent of each other?

- (c) The mean score and s.d. for a group of 374 girls in an aptitude test are found to be 98.7 and 14.08, respectively. These values for a group of 255 boys in the same test are 95.5 and 13.02, respectively. Judge by a suitable statistical test if there exists any significant difference between the mean scores of the two sexes (given that $t_{(0.05)}(627) = 2.576$). 2+4+4

3. (a) What is 'mode'? Cite a situation when you can't determine 'mode'.

- (b) Butterflies were captured from 10 different species of plants of an orchard. The numbers of butterflies obtained from different plants are shown in the table below. Examine if the butterflies were uniformly distributed or not over the different species of plants (given that $\chi^2_{(0.05)}(9) = 16.92$).

Plant sp.	A	B	C	D	E	F	G	H	I	J
Butterflies	25	32	17	23	15	34	27	19	22	26

- (c) You are provided with the following data; find out the regression equation of y on x .

(3)

$$\sum_{i=1}^{100} x_i = 280, \quad \sum_{i=1}^{100} y_i = 60, \quad \sum_{i=1}^{100} x_i^2 = 2384, \quad \sum_{i=1}^{100} y_i^2 = 117, \quad \sum_{i=1}^{100} x_i y_i = 438$$

2+4+4

4. (a) Explain multiplication theorem of probability with an example.
- (b) The following data show the yields of wheat (in quintal/acre) in 12 fields belonging to 3 villages, after using 3 different varieties of fertilizers (a, b and c) in the 3 villages.

Fertilizer a	Fertilizer b	Fertilizer c
125	120	124
122	117	126
124	116	130
121	119	120

Determine with the help of ANOVA whether there is any significant difference between the average yields of wheat in the 3 villages after using three different varieties of fertilizers? (Given that F at $df(2, 9)$ at 5% level of significance = 4.26).

- (c) A box contains 3 red and 7 white balls. You are asked to draw two balls, one after another, from the box, without any replacement. Find out the probability of getting (i) a red ball first and then a white ball, and (ii) a white ball first and then a red ball.

2+4+4
