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THIRD SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2018

(CUCBCSS—UG)

Complementary Course

MBY 3C 11—BIOSTATISTICS—I

Time : Three Hours

Maximum : 64 Marks

Part A

Answer all questions.

Each question carries ½ mark.

Fill in the blanks (Questions 1-4) :

1. The value which occurs most frequently in a set of observations is called ————

2. Any representative part of the population is known as ————

3. The measure of dispersion which is useful in studying the variations in the temperature of a region is ————

4. ———— scales are used for labeling variables without any quantitative value.

Choose the correct answer (Questions 5-8) :

5. Probability of drawing a king from a pack of cards is ————

    (a) $\dfrac{1}{4}$

    (b) $\dfrac{1}{12}$

    (c) $\dfrac{1}{13}$

    (d) $\dfrac{1}{2}$

6. If the mean of a binomial distribution is 10, then variance may be ————

    (a) 7.5.

    (b) 10.

    (c) 16.

    (d) All of the above.

7. Square of standard normal variate is :

    (a) Normal variate.

    (b) t-statistic.

    (c) F-statistic.

    (d) Chi-square variate.

Turn over

8. Which of the following is a positional average ?

   (a) Mean.   (b) Median.

   (c) Mode.   (d) Harmonic mean.

State True *or* False (Question 9-12) :

9. Poisson distribution is a positively skewed distribution.

10. In random sampling, each unit in the population has a pre assigned probability of being included in the sample.

11. Arithmetic mean is the most appropriate average in dealing with qualitative data.

12. In normal distribution, quartiles are not equidistant from the median.

$(12 \times ½ = 6 \text{ marks})$

Part B (Short Answer Type Questions)

Answer all questions.

Each question carries 2 marks.

13. Define sample space. Write down the sample space of the experiment '*tossing of two coins*'.

14. State addition theorem on probability. What is its application?

15. Distinguish between Population and Sample.

16. Define students t-distribution

17. Let A and B be two events of a random experiment and suppose P (A) = 0.4 and P $(A \cup B)$ = 0.7. Find P (B) if : (a) A and B are mutually exclusive ; and (b) A and B are independent.

18. Give the applications of Chi-square distribution in statistical theory.

19. Find the quartile deviation from the following observations:

    12, 20, 10, 16, 24, 11, 18.

20. Define : (a) Bernoulli trial ; and (b) Binomial distribution.

21. Illustrate the applications of Poisson distribution in the cell growth theory.

22. Define conditional probability and state multiplication theorem on probability.

$(10 \times 2 = 20 \text{ marks})$

Part C (Short Essays)

Answer any **six** *questions.*
Each question carries 3 marks.

23. Point out the desirable properties of a good average.

24. Calculate mode from the following frequency distribution:

Marks	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100
No. of Students	7	12	21	10	15

25. Compute mean deviation about mean of the following observations on a certain variable :

    21, 32, 25, 48, 30, 50, 75, 90, 55.

26. Define (a) Chi-square distribution ; and (b) F-distribution.

27. The probabilities that a person stopping at a petrol pump will get his tyres checked, oil checked and both cheeked are respectively 0.12, 0.29 and 0.07. What is the probability that a person stopping at this pump will have neither his tyres nor oil checked ? Find also the chance that a person who his oil checked will also have his tyres checked.

28. Distinguish between nominal and ordinal data with examples.

29. The incidence of a certain disease is such that on the average 20 % of workers suffer from it. If 10 workers are selected at random, find probability that (a) exactly two workers suffer from the disease ; and (b) not more than two workers suffer from the disease.

30. Write down the probability density function of normal distribution. Draw a rough sketch of normal probability curve.

$$(6 \times 3 = 18 \text{ marks})$$

Part D (Essays)

Answer any **two** *questions.*
Each question carries 10 marks.

31. (a) Explain the advantages of sampling method over census.

    (b) Find the average rate of increase in population which in the first decade had increased by 20 %, in the next by 30 % and in the third by 40 %.

Turn over

(c) Draw less than ogive and greater than ogive for the following data and hence find the value of median :

Income : 500 – 1000 1000 - 1500 1500 - 2000 2000 - 2500 2500 - 3000 3000 - 3500

No. of workers : 20 24 26 12 8 10

(3 + 2 + 5 = 10 marks)

32. (a) Explain any *two* measures of dispersion :

(b) Calculate the relative variability for the following sample observations of a population :

60.25, 62.38, 65.32, 61.41, 63.23.

(c) A product is assembled from the three components E, F and G and the probability of these components being defective is respectively 0.01, 0.02 and 0.05. What is the probability that the assembled product will not be defective ?

(3 + 4 + 3 = 10 marks)

33. (a) Explain the chief characteristics of normal distribution.

(b) Give any *two* applications of F-distribution.

(c) If the random variable X follows Poisson distribution such that $P(X = 1) = P(X = 2)$,

What is the mean and variance of the distribution ? Find also $P(X = 0)$.

(4 + 2 + 4 = 10 marks)

[2 × 10 = 20 marks]