

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



B.Sc. DEGREE EXAMINATION – STATISTICS

FIFTH SEMESTER – APRIL 2023

UST 5502 – BIOSTATISTICS AND SURVIVAL ANALYSIS

Date: 11-05-2023

Dept. No.

Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

PART – A

Answer ALL the Questions.

10 x 2 =20 Marks

1. State any two types of observation studies.
2. Define Odds ratio.
3. Define point estimation.
4. What do you understand by non-parametric test?
5. What are clinical trials?
6. Explain Phase I trial with an example.
7. What is censoring?
8. Define survival function.
9. Write the expression for $h(t)$ for Weibull distribution.
10. Obtain survival function of one parameter exponential distribution.

PART – B

Answer any FIVE Questions.

5 x 8 =40 Marks

11. Explain various types of bias present in Epidemiology.
12. Obtain Kappa statistic for the following data relating to 100 patients suffering from pancreatic carcinoma underwent contrast -enhanced computed tomography abdomen and two radiologists reviewed the report:

Pancreatic cancer	Grading by Radiologist 1		
	Yes (+)	No (-)	
Grading by Radiologist 2	Yes (+)	40	5
	No (-)	15	40

13. Explain Chi-square test of independence.
14. Write the test procedure for two sample t test.
15. Discuss in detail about Phase II and Phase III of clinical trials.
16. Describe Log-rank test.
17. Derive survival function and hazard function for Weibull distribution.
18. Suppose the survival distribution of a group of patients follow one parameter exponential distribution with $\lambda = 0.65$. Obtain the plot of $S(t)$ and $h(t)$.

PART – C

Answer any TWO Questions.

2 x 20 =40 Marks

19. a) Explain different types of observational studies. (10)
 b) Elaborate the contributions made by Ronald Ross and Alexander Fleming in the field of drug discovery. (10)
20. a) Rothenberg et al. investigated the effectiveness of using the Hologic Sahara Sonometer, A portable device that measures bone mineral density (BMD) in the ankle, in predicting a fracture. They estimated used a Hologic bone mineral density value of .57 as a cutoff. The results of the investigation yielded the following data:

	Confirmed Fracture	
	Present	Not Present
BMD (≤ 0.57)	214	670
BMD (> 0.57)	73	330

Calculate sensitivity, specificity of using a BMD value of .57 as a cutoff value for predicting Fracture. Also calculate False positive rate, False negative rate, Odds ratio and relative risk for the same. (12)

- b) Landolt et al. examined rates of posttraumatic stress disorder (PTSD) in mothers and fathers. Parents were interviewed 5 to 6 weeks after an accident or a new diagnosis of cancer or diabetes mellitus type I for their child. Twenty-eight of the 175 fathers interviewed and 43 of the 180 mothers interviewed met the criteria for current PTSD. Is there sufficient evidence for us to conclude that fathers are less likely to develop PTSD than mothers when a child is traumatized by an accident, cancer diagnosis, or diabetes diagnosis? (8)
21. Obtain Kaplan-Meier curve based on the data given below and comment on your conclusion:

Survival in 49 patients with Dukes'c colorectal cancer randomly assigned to either lionoleic acid treatment or control treatment	
Treatment	Survival time (in months)
Linoleic acid	1+,5+,6,6,9+,10,10,10+,12,12,12,12,12+,13+,15+,16+,20+,24,24+,27+,32,34+,36+,36+,44+
control	3+,6,6,6,6,8,8,12,12,12+,15+,16+,18+,18+,20,22+,24,28+,28+,28+,30,30+,33+,42

22. Explain Cox proportional hazard model and discuss any two methods of evaluating the proportional hazard assumption.

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