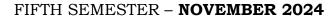
LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034



B.Sc. DEGREE EXAMINATION – **STATISTICS**





UST 5502 - BIOSTATISTICS AND SURVIVAL ANALYSIS

Date: 11-11-2024	Dept. No.	Max.: 100 Marks
Time: 09:00 am-12:00 pm		

	SECTION A - K1 (CO1)					
	Answer ALL the Questions $(10 \times 1 = 10)$					
1.	Define the following					
a)	Odds ratio.					
b)	Point Estimation.					
c)	ICH.					
d)	Gamma distribution.					
e)	Censoring.					
2.	Multiple Choice Question					
a)	are used to report case control study.					
	a) Odds Ratio b) Split plot design c) Logistic regression d)None of the above					
b)	test is used to test the independence of attributes.					
	a) t test b) F test c) z test d) Chi-square test					
c)	is a complex risky, expensive and time consuming process.					
	a) Clinical test b) Drug discovery c) Phase I trial d) Phase III trial					
d)	Hazard rate is constant for					
	a) Weibull Distribution b) Gamma Distribution c) Exponential Distribution d) Lognormal					
	Distribution					
e)	is a statistical technique that analyzes and illustrates survival rates over time.					
	a)Life table b) Kaplan-Meier Method c) Censoring d) None of the above					
	SECTION A - K2 (CO1)					
	Answer ALL the Questions (10 x 1 = 10)					
3.	Fill in the blanks					
a)	is the ratio of the probability of an event occurring in the exposed group versus the					
	probability of the event occurring in the non-exposed group.					
b)	is used to compare two independent groups when the data is not normally					
	distributed.					
c)	Survival function of exponential distribution is					
<u>d)</u>	evaluate ways to promote behavioral changes that improve health.					
e)	is used to study the relationship between time and event outcome and explanatory					
4	variable S. H. C.					
4.	Match the following					
a)	Observational study - Edward Jenner					
b)	Non parametric test - Survival analysis					
c)	Survival function - Cohort Study					
<u>d)</u>	Drug Discovery - Distribution free test					
e)	Censoring - Non increasing function					

SECTION B - K3 (CO2)

Answer any TWO of the following in 100 words each.

 $(2 \times 10 = 20)$

- 5. Explain different types of bias present in epidemiology
- 6. 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 2	
Grading by Radiologist		YES	NO
1	YES	40	5
	NO	15	40

- 7. Explain in detail about Phase II and Phase III of clinical trial.
- 8. Obtain S(t) and h(t) for Exponential distribution and Plot S(t) and h(t) for $\lambda = 2$.

SECTION C - K4 (CO3)

Answer any TWO of the following in 100 words each.

 $(2 \times 10 = 20)$

- 9. Discuss the procedure of log rank test.
- 10. Discuss the different types of observational studies.
- 11. Discuss the procedure for Median test and Wilcoxon signed rank test.
- 12. Discuss the contribution of Edward Salk and Alexander Fleming in the field of drug discovery.

SECTION D - K5 (CO4)

Answer any ONE of the following in 250 words $(1 \times 20 = 20)$

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 Frac	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.

- 14. Explain (i) clinical trial with independent concurrent control with a diagram.
 - (ii) Clinical trial with self control with a diagram.

SECTION E - K6 (CO5)

Answer any ONE of the following in 250 words $(1 \times 20 = 20)$

- 15. Consider a hypothetical data of a group of patients receiving standard anti-retroviral therapy. The data shows the time of survival (in days) among the patients entered in a clinical trial 6, 12, 21, 27, 32, 39, 43, 43, 46+, 89, 115+, 139+, 181+, 211+, 217+, 261, 263, 270, 295+, 311, 335+, 346+, 365+ (+ means these patients are still surviving after mentioned days in the trial.). Another hypothetical data of a group of patients receiving new Ayurvedic therapy for HIV infection. The data shows the time of survival (in days) among the patients entered in a clinical trial 9, 13, 27, 38, 45+, 49, 49, 79+, 93, 118+, 118+, 126, 159+, 211+, 218, 229+, 263+, 298+, 301, 333, 346+, 353+, 362+. Construct Kaplan-Meier curves and find out which treatment is better?
- 16. Ten female patients with breast cancer are randomized to receive either CMF (cyclic administration of cyclophosphamide, methatrexate, and fluorouracil) or no treatment after a radical mastectomy. At the end of two years, the following times to relapse (or remission times) in months are recorded:

CMF (group 1): 23, 16+, 18+, 20+, 24+

Control (group 2): 15, 18, 19, 19, 20

Analyse using Log-Rank test.

