

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2026
(Sixth Semester)

Branch- STATISTICS

BIO STATISTICS AND SURVIVAL ANALYSIS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

$$(10 \times 1 = 10)$$

Module No.	Question No.	Question	K Level	CO
1	1	Statistical data are collected for, a) Collecting data without any purpose b) A given purpose c) Any purpose d) None of the above	K1	CO1
	2	A questionnaire should be a) reliable b) valid c) difficult d) both a and b	K2	CO1
2	3	Negative values for Kappa usually have nosignificance a) Biological b) Clinical c) Experimental d) Nutritional	K1	CO2
	4	To test an hypothesis about proportion of items in a class, the usual test is a) t – test b) F – test c) Z-test d) Chi square test	K2	CO2
3	5	Thecan also be expressed in terms of the hazard function by exponentiating the negative of the cumulative hazard function. a) survival function b) hazard function c) <i>Exponential function</i> d) <i>Logarithmic function</i>	K1	CO3
	6	The cumulative hazard function is the integral of the hazard function between integration limits of..... a) 0 and 1 b) t and 0 c) -1 and 1 d) 0 and t	K2	CO3
4	7	When doing a survival analysis, we usually refer to the time variable as a) Kaplan Meiyar variable b) survival time c) Hazard function d) Reliability	K1	CO4
	8	Most survival analyses consider a key data analytical problem called a) Survival analysis b) Hazard model c) Prediction d) censoring	K2	CO4
5	9	The Cox model formula says that the hazard at time t is the product of two quantities. The first of these, $h_0(t)$, is called the a) Cox proportional hazard model b) Baseline hazard function c) PH assumptions d) Survival curve	K1	CO5
	10	If time-dependent variables are considered the Cox model form may still be used, but such a model no longer satisfies the PH assumption, and is called a) Extended cox model b) Extended cox linear model c) Baseline hazard model d) Cox proportional model	K2	CO5

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SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 × 7 = 35)

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Module No.	Question No.	Question	K Level	CO																																																						
1	11.a.	Explain the scope of Bio Statistics.	K2	CO1																																																						
	(OR)																																																									
	11.b.	Describe the observational studies.																																																								
2	12.a.	Comparison of visual acuity in people ages 10 -19 with dominant and sex linked RP. Perform the Wilcoxon rank-sum test for the data	K3K4	CO2																																																						
		<table><tr><th>Visual acuity</th><th>Domina nt</th><th>Sex- linked</th><th>Combined sample</th><th>Range of ranks</th><th>Average rank</th></tr><tr><td>20 -20</td><td>5</td><td>1</td><td>6</td><td>1 – 6</td><td>3.5</td></tr><tr><td>20 – 25</td><td>9</td><td>5</td><td>14</td><td>7 – 20</td><td>13.5</td></tr><tr><td>20 – 30</td><td>6</td><td>4</td><td>10</td><td>21 – 30</td><td>25.5</td></tr><tr><td>20 – 40</td><td>3</td><td>4</td><td>7</td><td>31-37</td><td>34.0</td></tr><tr><td>20 – 50</td><td>2</td><td>8</td><td>10</td><td>38 – 47</td><td>42.5</td></tr><tr><td>20 – 60</td><td>0</td><td>5</td><td>5</td><td>48- 52</td><td>50.0</td></tr><tr><td>20 – 70</td><td>0</td><td>2</td><td>2</td><td>53- 54</td><td>53.5</td></tr><tr><td>20 – 80</td><td>0</td><td>1</td><td>1</td><td>55</td><td>55.0</td></tr></table>			Visual acuity	Domina nt	Sex- linked	Combined sample	Range of ranks	Average rank	20 -20	5	1	6	1 – 6	3.5	20 – 25	9	5	14	7 – 20	13.5	20 – 30	6	4	10	21 – 30	25.5	20 – 40	3	4	7	31-37	34.0	20 – 50	2	8	10	38 – 47	42.5	20 – 60	0	5	5	48- 52	50.0	20 – 70	0	2	2	53- 54	53.5	20 – 80	0	1	1	55	55.0
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12.b.	In a study on cardiovascular risk factors among young adults, the occurrence of type II diabetes and hyper tension are examined and tabulated below.																																																									
	<table><tr><th colspan="4">hyper tension</th></tr><tr><th>Type II diabetes</th><th>No</th><th>Yes</th><th>Total</th></tr><tr><td>No</td><td>2105</td><td>51</td><td>2156</td></tr><tr><td>Yes</td><td>57</td><td>5</td><td>62</td></tr><tr><td>Total</td><td>2162</td><td>5</td><td>62</td></tr></table>	hyper tension				Type II diabetes	No	Yes	Total	No	2105	51	2156	Yes	57	5	62	Total	2162	5	62																																					
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On the basis of the data, can we conclude type II diabetes and hypertensions are independent?																																																										
3	13.a.	Obtain the analytical estimation procedure for exponential distribution.	K2K3	CO3																																																						
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	13.b.	Explain Standardised Rates and Ratios of survival function.																																																								
4	14.a.	Describe the General Features of Kaplan Meier Survival Curves.	K2K3 K4	CO4																																																						
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	14.b.	Write a note on comparison of survival distribution.																																																								
5	15.a.	Why the Cox PH Model Is Popular?	K2K3 K4	CO5																																																						
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	15.b.	Obtain the Maximum likelihood estimation of Cox PH model.																																																								

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Module No.	Question No.	Question	K Level	CO																				
1	16	Explain parallel and cross over designs in Bio Statistics.	K2	CO1																				
2	17	Compute the Kappa statistic, and assess its statistical significance using the beef-consumption data in the following Table. Amount of beef consumption reported by 537 female American nurses at two different surveys. Compute the Kappa statistic, and assess its statistical significance using the beef-consumption. <table><tr><td></td><td colspan="2">Survey 2</td><td></td></tr><tr><td>Survey 1</td><td>≤1 serving/week</td><td>>1 serving/week</td><td>Total</td></tr><tr><td>≤1 serving/week</td><td>136</td><td>92</td><td>228</td></tr><tr><td>>1 serving/week</td><td>69</td><td>240</td><td>309</td></tr><tr><td>Total</td><td>205</td><td>332</td><td>537</td></tr></table>		Survey 2			Survey 1	≤1 serving/week	>1 serving/week	Total	≤1 serving/week	136	92	228	>1 serving/week	69	240	309	Total	205	332	537	K3K4	CO2
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3	18	Describe the Relative and Corrected Survival Rates	K2K3	CO3																				
4	19	Illustrate the Log-Rank Test for Several Groups of Kaplan Meier Survival.	K2K3 K4	CO4																				
5	20	Describe the adjusted Survival Curves using Cox PH Models .	K2K3 K4	CO5																				

Z-Z-Z END
