

Model Question Paper-1 with effect from 2019-20 (CBCS Scheme)

USN

--	--	--	--	--	--	--	--	--	--

Fourth Semester B.E. Degree Examination Statistics for Engineers

TIME: 03 Hours

Max. Marks: 100

Note: Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

Module -1				*Bloom's Taxonomy Level	Marks			
Q.01	a	Illustrate the role and need of statistical thinking in engineering practice		L2	6			
	b	What are the three basic methods of collecting data? Explain the process of collecting data using the observational study.		L2	6			
c	Target achieved by 2 workers are given below:			L3	8			
	Worker 1	88	68			89	92	113
	Worker 2	76	68			90	86	76
		Determine which worker is more consistent						
OR								
Q.02	a	Illustrate with a neat diagram how data are summarized, scrutinized and presented.		L2	5			
	b	What are different measures of central tendency? What do you understand by "Variance"? Give examples		L2	8			
	c	List the applications of Normal, Binomial, Hyper geometric and Poisson distributions.		L2	7			
Module-2								
Q. 03	a	With suitable examples, explain under the circumstances normal approximation is used for binomial distribution		L2	6			
	b	The reaction time of driver to visualize stimulates is normally distribution with a mean of 0.4 seconds and a standard deviation of 0.05 seconds.		L3	8			
		a) What is the probability that a reaction requires more than 0.5 seconds?						
b) What is the probability that a reaction requires more than 0.4 and 0.5 seconds?								
c	c) What is the reaction time that is exceeded 90% of the time?							
	The time between arrivals of taxi at a busy intersection is exponentially distributed with a mean of 10 minutes.							
		a) What is probability that you wait longer than one hour for a taxi?		L3	6			
		b) Suppose you have already waiting for one hour for a taxi. What is the probability that one arrives within next 10 minutes?						
OR								
Q.04	a	Explain the properties of good estimators		L3	5			
	b	In a random sample of 85 automobile engine crank shaft bearings, 10 have a surface finish rougher than the specifications allowed. Find the point estimate of the proportion of bearings in population that exceeds roughness specifications and also 95% two sided confidence intervals for population proportion P.		L3	10			
		c) Explain the characteristics of normal curve.						
Module-3								
Q. 05	a	With examples, distinguish between:		L2	6			
		a) Null hypothesis and alternate hypothesis						

		b) Type I and Type II errors c) One tailed test and Two-tailed tests.																												
	b	A restaurant at Mumbai has an average sales of 500 cups of tea per day. Because of development of metro station near by it expects to increase its sales. During the first 12 days after the start of metro station, daily sales were as under: 550, 570, 490, 615, 505, 580, 570, 460, 600, 580, 530, 526 on the basis of this sample information, can you conclude weather the restaurant sales have increased? Use 5% level of significance	L3	14																										
OR																														
Q. 06	a	In a sample of 1000 people of a region, 540 were found to be rice eaters and rest are wheat eaters. Can you assume that both rice and wheat are equally popular in this region at 1% level of significance? Explain	L2	12																										
	b	Define X as the number of under filled bottles from a filling operation in a carton of 24 bottles. Sixty cartons are inspected and the following observation on X are recorded. <table border="1" style="margin-left: 20px;"> <tbody> <tr> <td>Values</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>Frequency</td> <td>39</td> <td>23</td> <td>12</td> <td>1</td> </tr> </tbody> </table> <p>a) Based on these 75 observations, Is a binomial distribution an appropriate model? Perform a goodness of fit procedure with $\alpha=0.05$</p> <p>b) Estimate the P value of the test.</p>	Values	0	1	2	3	Frequency	39	23	12	1	L5	8																
Values	0	1	2	3																										
Frequency	39	23	12	1																										
Module-4																														
Q. 07	a	Compare and Differentiate between correlation and regression with example.	L2	10																										
	b	R & D expenditure and the annual profit for an organization for 6 years is as below: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Year</th> <th>2000</th> <th>2001</th> <th>2002</th> <th>2003</th> <th>2004</th> <th>2005</th> </tr> </thead> <tbody> <tr> <td>R & D expenditure (rupees lakhs)</td> <td>5</td> <td>11</td> <td>4</td> <td>5</td> <td>3</td> <td>2</td> </tr> <tr> <td>Annual Profit (rupees lakhs)</td> <td>31</td> <td>40</td> <td>30</td> <td>34</td> <td>25</td> <td>20</td> </tr> </tbody> </table> <p>a) Draw the scatter diagram. b) Obtain the estimating equation for predicting the annual profit from R& D expenditure c) For R& D expenditure of 8 lakhs, determine the estimated profit. d) Determine correlation coefficient and R-squared value.</p>	Year	2000	2001	2002	2003	2004	2005	R & D expenditure (rupees lakhs)	5	11	4	5	3	2	Annual Profit (rupees lakhs)	31	40	30	34	25	20	L4	10					
Year	2000	2001	2002	2003	2004	2005																								
R & D expenditure (rupees lakhs)	5	11	4	5	3	2																								
Annual Profit (rupees lakhs)	31	40	30	34	25	20																								
OR																														
Q. 08	a	Explain the properties of least square estimators and estimation of variances	L2	10																										
	b	Two variables X and Y are related as given below: <table border="1" style="margin-left: 20px;"> <tbody> <tr> <td>Values of X</td> <td>63</td> <td>63</td> <td>67</td> <td>64</td> <td>68</td> <td>62</td> <td>70</td> <td>66</td> <td>68</td> <td>67</td> <td>69</td> <td>71</td> </tr> <tr> <td>Values of Y</td> <td>68</td> <td>66</td> <td>68</td> <td>65</td> <td>69</td> <td>66</td> <td>68</td> <td>65</td> <td>71</td> <td>67</td> <td>68</td> <td>70</td> </tr> </tbody> </table> <p>Find $\sum X$, $\sum Y$, $\sum X^2$, $\sum Y^2$ and $\sum XY$</p> <p>a) Construct a scatter diagram b) Find the least square regression line of Y on X c) Find the least square regression line of X on Y</p>	Values of X	63	63	67	64	68	62	70	66	68	67	69	71	Values of Y	68	66	68	65	69	66	68	65	71	67	68	70	L3	10
Values of X	63	63	67	64	68	62	70	66	68	67	69	71																		
Values of Y	68	66	68	65	69	66	68	65	71	67	68	70																		
Module-5																														
Q. 09	a	What are the advantages of statistically designed experiments? Explain with suitable engineering examples.	L2	8																										
	b	Briefly explain the following terms:	L2	8																										

		a) Randomization b) Replication c) Local control or Error control d) Analysis of variance		
	c	Explain the applications of design of experiments	L2	4
OR				
Q. 10	a	Explain randomization with complete block design	L2	5
	b	Briefly explain the following terms: a. Single factor experiment tests b. Random effects model c. Analysis of variance	L2	15

*Bloom's Taxonomy Level: Indicate as L1, L2, L3, L4, etc. It is also desirable to indicate the COs and POs to be attained by every bit of questions.