

## Model Question Paper-2 with effect from 2019-20 (CBCS Scheme)

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### 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	List the application of binomial, Poisson and hyper geometric distributions	L1	6
	b	Discuss and compare the various methods of graphical presentation of data	L2	6
	c	In a pharmacy there are 5 employees who are often late. The managers from his past experience has estimated that the chance that any employee is late in a day is 0.4. Find the probability that any given day no employee is late, 1,2,3,4 or all being late. Also determine mean and standard deviation of the distribution.	L3	8
OR				
Q.02	a	Discuss the role and need of statistical thinking in engineering practice.	L2	6
	b	List the characteristics of binomial and poisson distribution.	L1	6
	c	What are different measures of central tendency? What do you understand by "Variance"? Give examples	L2	8
Module-2				
Q.03	a	Discuss the properties of good estimators	L2	6
	b	Discuss the characteristics of normal distribution. Explain the circumstances under which binomial distribution is approximated to normal.	L2	6
	c	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. 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) What is the reaction time that is exceeded 90% of the time?	L3	8
OR				
Q.04	a	A training program is designed to upgrade the supervisory skills of production line managers. This program is self-administered and hence requires different number of hours to complete. A study of past participants indicate the mean length of time spent on program is 500 hrs. with a standard deviation of 100 hrs. What is the probability that a candidate selected at random will survive? a) Fewer than 580 hrs. b) Between 420 and 570 hrs. c) More than 700 hrs. to complete the program	L3	10
	b	Define a point estimator. Give examples of estimation problems encountered in engineering. Discuss the properties of good estimators.	L2	10
Module-3				
Q.05	a	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	L4	10

		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 whether the restaurant sales have increased? Use 5% level of significance																												
	b	A semiconductor manufacturer produces controllers used in automobile engine application. The customer requires that the process fallout or fraction defective at a critical manufacturing step not exceed 0.05 and that the manufacturer demonstrates process capability at this level of quality using $\alpha = 0.05$ . The semiconductor manufacturer takes a random sample of 2000 devices and finds that four of them are defective. Can the manufacturer demonstrate process capacity for the customer? (Solve using the hypothesis that produce on proportion).	L3	10																										
<b>OR</b>																														
Q. 06	a	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;"> <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> </table> <p>a) Based on these 75 observations, Is a binomial distribution an appropriate model? Perform a goodness of fit procedure with <math>\alpha = 0.05</math></p> <p>b) Calculate the P value of the test.</p>	Values	0	1	2	3	Frequency	39	23	12	1	L4	10																
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Frequency	39	23	12	1																										
	b	With examples, distinguish between: a) Null hypothesis and alternate hypothesis b) Type I and Type II errors c) One tailed test and Two-tailed tests.	L2	10																										
<b>Module-4</b>																														
Q. 07	a	Two variables X and Y are related as given below: <table border="1" style="margin-left: 20px;"> <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> </table> <p>Find <math>\sum X</math>, <math>\sum Y</math>, <math>\sum X^2</math>, <math>\sum Y^2</math> and <math>\sum XY</math></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	L4	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																		
	b	Draw neat sketches i) positive linear correlation ii) negative linear correlation iii) no correlation a scatter diagram of two variables X and Y and explain with suitable engineering examples.	L2	10																										
<b>OR</b>																														
Q. 08	a	Differentiate between correlation and regression with example.	L2	8																										
	b	R & D expenditure and the annual profit for an organization for 6 years is as below: <table border="1" style="margin-left: 20px;"> <tr> <td>Year</td> <td>2000</td> <td>2001</td> <td>2002</td> <td>2003</td> <td>2004</td> <td>2005</td> </tr> <tr> <td>R &amp; 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> </table> <p>a) Draw the scatter diagram.  b) Obtain the estimating equation for predicting the annual profit from R&amp; D expenditure  c) For R&amp; D expenditure of 8 lakhs, determine the estimated profit.</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	12					
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		d) Compute correlation coefficient and R-squared value.																											
<b>Module-5</b>																													
Q. 09	a	What are the advantages of statistically designed experiments? Explain with suitable engineering examples.	L2	8																									
	b	Write short notes on applications of design of experiments	L2	8																									
	c	Briefly explain the following terms: a. Random effects model b. One way and Two way ANOVA	L2	4																									
OR																													
Q. 10	a	The following table gives the number of refrigerators sold by four salesmen in three months May, June and July: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Month</th> <th colspan="4">Salesman</th> </tr> <tr> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>May</td> <td>50</td> <td>40</td> <td>48</td> <td>39</td> </tr> <tr> <td>June</td> <td>46</td> <td>48</td> <td>50</td> <td>45</td> </tr> <tr> <td>July</td> <td>39</td> <td>44</td> <td>40</td> <td>39</td> </tr> </tbody> </table> <p>Is there a significant difference in sales made by four salesman and what is the significant difference in the sales made during different months?</p>	Month	Salesman					A	B	C	D	May	50	40	48	39	June	46	48	50	45	July	39	44	40	39	L4	10
Month	Salesman																												
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	b	A study investigated the perception of corporate ethical values among individuals specializing in the marketing. Suppose that the data shown below were obtained in a similar study (higher score indicate higher ethical values). Use $\alpha = 0.05$ , test to see if there are significant differences in perception for three groups of specialists. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Marketing Manager</th> <th>Marketing Research</th> <th>Advertising</th> </tr> </thead> <tbody> <tr> <td>6</td> <td>5</td> <td>6</td> </tr> <tr> <td>5</td> <td>5</td> <td>7</td> </tr> <tr> <td>4</td> <td>4</td> <td>6</td> </tr> <tr> <td>5</td> <td>4</td> <td>5</td> </tr> <tr> <td>6</td> <td>5</td> <td>6</td> </tr> <tr> <td>4</td> <td>4</td> <td>6</td> </tr> </tbody> </table>	Marketing Manager	Marketing Research	Advertising	6	5	6	5	5	7	4	4	6	5	4	5	6	5	6	4	4	6	L4	10				
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\*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.