Ref. No.: Ex/Che/PE/B/T/414C/2024

B.E Chemical Engineering Fourth Year First Semester Examination-2024

Applied Statistics for Chemical Engineers

Time: 3 hrs. Full marks: 100

Answer four questions taking one from each CO i.e. CO1, CO2, CO3, CO4.

<table>
<tr><th>CO No.</th><th>Q. No</th><th>Questions</th><th>Marks</th></tr>
<tr><td rowspan="2">CO 1</td><td>1 a.</td><td>When does t and Standard normal distribution become identical? Draw roughly how the shape of t and standard normal distribution change with degree of freedom.</td><td>05</td></tr>
<tr><td>1. b</td><td>The scores of two batsmen, A and B, in ten innings during a certain season, are as under:
<table><tr><td>A</td><td>32</td><td>28</td><td>47</td><td>63</td><td>71</td><td>39</td><td>10</td><td>60</td><td>96</td><td>14</td></tr><tr><td>B</td><td>19</td><td>31</td><td>48</td><td>53</td><td>67</td><td>90</td><td>10</td><td>62</td><td>40</td><td>80</td></tr></table>Find which of the batsmen is more consistent in scoring.</td><td>20</td></tr>
<tr><td rowspan="2">CO 2</td><td>2</td><td>In turning out certain toys in a manufacturing process in a factory, the average number of defectives is 10%. Find the probability of getting exactly 3 defectives in a sample of 10 toys chosen at random,
a. By using binomial distribution.
b. By using Poisson approximation to the binomial distribution.

Comment on the results.</td><td>25</td></tr>
<tr><td>3</td><td>The mean weight of 500 male students in a certain college is 151kgs. and the standard deviation is 15kgs. Assuming that the weights are normally distributed, find how many students weigh (a) between 120 and 155 kgs., (b) more than 155 kgs. [Given Φ (0.27) = 0.6064 and Φ (2.07) = 0.9808, where Φ (t) denotes the area under standard normal curve to the left of the ordinate at t].</td><td>25</td></tr>
<tr><td>CO 3</td><td>4</td><td>In an experiment on pea-breading, Mendel obtained the following frequencies of seeds: Round and yellow- 315; Wrinkled and yellow-101; Round and green- 108; Wrinkled and green-32; Theory predicts that the frequencies should be in the proportions 9:3:3:1. Examine the correspondence between theory and observations. (5% value of χ^2 for 3 d.f is 7.815)</td><td>25</td></tr>
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CO 4	5 a.	A manufacturer claimed that at least 90% of the components which he supplied, conformed to specifications. A random sample of 200 components showed that only 164 were up to the standard. Test his claim at 1% level of significance.	15
	5 b.	Find the expectation and standard error of sample proportion in simple random sampling with replacement from a finite population.	10
	6	A population consists of the four members 3, 7, 11, 15. Consider all possible samples of size two which can be drawn with replacement from this population. Find i. The population mean ii. The population standard deviation iii. The mean of the sampling distribution of means Solve this problem if sampling is without replacement.	25