Total No. of Questions – [03] Total No. of Printed Pages: 02

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MAY 2022 (ENDSEM) EXAM

S.Y. INFORMATION TECHNOLOGY (SEMESTER - II)

COURSE NAME: PROBABILITY AND STATISTICS

COURSE CODE: ES22201IT

(PATTERN 2020)

Time: [1Hr] [Max. Marks: 30]

(*) Instructions to candidates:

1) **Figures to the right indicate full marks.**
2) **'a' part of every question is compulsory**
3) **Use of scientific calculator is allowed**
4) **Use suitable data where ever required**

Q.1 a) With the help of example explain the difference between Mean, Median, Mode, Variance and Standard deviation. [4]

b) Consider the following data and find Variance, Standard deviation, Quartile and inner Quartile of the data. [6]
Data -> 2,2,3,4,5,1,5,4,3,3.

OR

b) In a chemical process, the amount of a certain type of impurity in the output is difficult to control and is thus a random variable. Speculation is that the population mean amount of the impurity is 0.20 gramper gram of output. It is known that the standard deviation is 0.1 gram per gram. An experiment is conducted to gain more insight regarding the speculation that $\mu = 0.2$. The process is run on a lab scale 50times and the sample average $\bar{x}$ turns out to be 0.23gram per gram. Comment on the speculation that the mean amount of impurity is 0.20 gram per gram. Make use of the Central Limit Theorem in your work. Consider $z > 2.12 = 0.0170$. [6]

Q.2 a) With the help of example and graph distinguish between Null hypothesis vs. Alternative hypothesis and One tail vs. Two Tail. [4]

b) According to a dietary study, high sodium intake may be related to ulcers, stomach cancer, and migraine headaches. The human requirement for salt is only 220 milligrams per day, which is surpassed in most single servings of ready-to-eat cereals. If a [6]

random sample of 20 similar servings of a certain cereal has a mean sodium content of 244 milligrams and a standard deviation of 24.5 milligrams, does this suggest at the 0.05 level of significance that the average sodium content for a single serving of such cereal is greater than 220 milligrams? Assume the distribution of sodium contents to be normal. Consider critical region $t > 1.729$ for $v = 19$.

OR

b) Draw ANOVA table for the given data. [6]

Drug A	Drug B	Drug C
30	25	15
35	20	20
40	30	25
25	25	20
35	30	20

Q.3 a) Explain simple linear regression model with help of example. Also estimate linear line equation of the example by least square error method. [4]

b) The weights of 5 people before they stopped smoking and 5 weeks after they stopped smoking, in kilograms, are as follows: [6]

	Individual				
	1	2	3	4	5
Before	66	80	69	52	75
After	71	82	68	56	73

Use the signed-rank test for paired observations to test the hypothesis, at the 0.05 level of significance, that giving up smoking has no effect on a person' s weight against the alternative that one' s weight increases if he or she quits smoking. Consider Critical region as <1 for n =5.

OR

b) To find out whether a new serum will arrest leukemia, nine patients, who have all reached an advanced stage of the disease, are selected. Five patients receive the treatment and four do not. The survival times, in years, from the time the experiment commenced are [6]

Treatment	2.1	5.3	1.4	4.6	0.9
No treatment	1.9	0.5	2.8	3.1	

Use the rank-sum test, at the 0.05 level of significance, to determine if the serum is effective. Consider Critical region as $\mu_1 <= 2$