Abhrajit Mitra

VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF MECHANICAL ENGINEERING

CONTINUOUS ASSESSMENT TEST - I

FALL SEMESTER 2022-2023

SLOT: F2+TF2

Programme Name & Branch : B.Tech
Course Code/Name : BMGT107L / Business Analytics
Faculty Name(s) : Dr. Gangatharan C.
Class Number(s) : VL2022230102722
Duration: 90 min. **Max. Marks: 50**

General instruction(s):

- No need to carry statistical tables.
- Assume necessary conditions if needed and quote them clearly in the answers.

Q. No	Question	Marks
1.	The given dataset contains the number of e-mails received per week from the customers of a home appliances seller. 5, 9, 5, 23, 27, 55, 34, 7, 30, 15, 22, 60, 14, 52, 297, 8, 51, 15, 51, 35, 15, 39, 137, 43, 38, 14, 93, & 7. Determine: a. Mean; b. Mode; c. Median; d. Standard deviation; e. Which is a better measure for central tendency: Mean or Median? Why?	10
2.	Blood glucose levels for obese patients have a mean of 100 with a standard deviation of 15. A researcher thinks that a diet high in raw corn-starch will have a positive or negative effect on blood glucose levels (at 5% level of significance). A sample of 30 patients who have tried the raw corn-starch diet have a mean glucose level of 140. Test the hypothesis that the raw corn-starch had an effect.	10
3.	a) Discuss the steps involved in hypothesis testing? (6 marks) b) Explain the errors in hypothesis testing. (4 marks)	10
4.	A psychologist was interested in exploring whether or not male and female college students have different driving behaviors. She conducted a survey of a random $n = 34$ male college students and a random $m = 29$ female college students. Here is a descriptive summary of the results of her survey: **Males (X)**: $n = 34$, $\overline{x} = 105.5$, $s_x = 20.1$ **Females (Y)**: $m = 29$, $\overline{y} = 90.9$, $s_y = 12.2$ Is there sufficient evidence at the $\alpha = 0.05$ level to conclude that the variance of the fastest speed driven by male college students differs from the variance of the fastest speed driven by female college students?	10

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5.	A sample of 200 components is selected from the output of a factory that uses three different machines to manufacture these components. Each component in the sample is inspected to determine whether or not it is defective. The machine that produced the component is also recorded. The results are as follows:	10

	Machine			
Outcome	A	B	C	**Total**
Defective	8	6	12	26
Non-defective	54	62	58	174
Total	62	68	70	200

Determine (at $\alpha = 0.05$) whether or not there is a relationship between the proportion of defectives and the machine used.

Critical Values:

At $\alpha = 0.05$:

$\chi^2_{(\nu=2)} = 5.991$; $\chi^2_{(\nu=3)} = 7.815$; $\chi^2_{(\nu=6)} = 12.592$;

$F_{(\nu1=34, \nu2=29)} = 1.83$; $F_{(\nu1=33, \nu2=28)} = 1.85$;

$Z = 1.645$ (one-tailed); $Z = 1.96$ (two-tailed).