

Monday 4/1/2016

Second Exam

allowed time: 50 min

Student Name:

Student ID number:

Problem #1: chose the correct answer for the following questions and fill the given table (12mark)

Answer	Question							
	1	2	3	4	5	6	7	8
a								
b								
c								
d								
e								

- The galvanometer is a DC measuring device work in which of the following principles
a. resistive b. capacitive **c. electromagnetic** d. photovoltaic e. none of the previous
- Iron vane is a device used to measure
a. Alternating current b. AC voltage c. direct current d. DC voltage e. none of the previous
- Input circuit is a piece of measurement system found commonly between
a. signal conditioner b. transmission c. Display and processing **d. transducer and signal conditioner** e. none of the previous
- 10 Ampere current passes through 1m length conductor. If 40% of this conductor is located in 5 Webber/m² magnetic flux. Find the generated force between the conductor and the magnetic flux
a. 50 N **b.20N** c.30N d.40N e. none of the previous
- Piezoelectric transducer has the following values: voltage sensitivity = 0.01 V.m/N, thickness = 10mm is used to measure static pressure. If the generated voltage was 10 Volt, what would be the value of pressure
a. 100 kPa b.50 kPa c.25 kPa d. 10 kPa e. none of the previous
- An experiment produces 8 points of data. What is the maximum order of curve fitting curve can be obtained
a. 4 b.5 c.6 **d. 7** e. none of the previous
- When we have the case of imprecise points, the curve fitting is called
a. interpolation **b. regression** c. random d. sinusoidal e. none of the previous
- Which of the following measuring devices has one movable and one fixed plate
a. DC ammeter b. AC ammeter **c. DC voltmeter** d. AC voltmeter e. none of the previous

Problem #2: for the given data

(8marks)

1. Find the standard deviation for Y values
2. Find linear fitting curve equation for Y values

Xi	Yi
1	15
2	20
3	25
4	30
5	35

Solution:- n=5

$$1. Y_m = \frac{15 + 20 + 25 + 30 + 35}{5} = 25$$

$$\sigma = \sqrt{\frac{1}{n} \sum_{i=1}^n (Y_i - Y_m)^2} = \sqrt{\frac{1}{5} 250} = 7.07$$

$$\text{Or } \sigma = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (x_i - x_m)^2} = \sqrt{\frac{1}{5-1} 250} = 7.9$$

2. Y=ax+b

$$a = \frac{n \sum x_i y_i - (\sum x_i)(\sum y_i)}{n \sum x_i^2 - (\sum x_i)^2} = \frac{(5)(425) - (15)(125)}{(5)(55) - (15)^2} = 5$$

$$b = \frac{(\sum y_i)(\sum x_i^2) - (\sum x_i y_i)(\sum x_i)}{n(\sum x_i^2) - (\sum x_i)^2} = \frac{(125)(55) - (425)(15)}{(5)(55) - (15)^2} = 10$$

$$Y = 5X + 10$$

	Xi	X²i	Yi	(Y_i - Y_m)²	Xi*Yi
	1	1	15	100	15
	2	4	20	25	40
	3	9	25	0	75
	4	16	30	25	120
	5	25	35	100	175
Σ	15	55	125	250	425

Monday 4/1/2016

Second Exam

allowed time: 50 min

Student Name:

Student ID number:

Problem #1: chose the correct answer for the following questions and fill the given table (12mark)

Answer	Question							
	1	2	3	4	5	6	7	8
a								
b								
c								
d								
e								

9. When we have the case of imprecise points, the curve fitting is called

- a. interpolation **b. regression** c. random d. sinusoidal e. none of the previous

10. Iron vane is a device used to measure

- a. DC voltage b. AC voltage c. direct current **d. Alternating current** e. none of the previous

11. 10 Ampere current passes through 1m length conductor. If 60% of this conductor is located in 5 Webber/m² magnetic flux. Find the generated force between the conductor and the magnetic flux

- a. 50 N b. 20N **c. 30N** d. 40N e. none of the previous

12. Input circuit is a piece of measurement system found commonly between

- a. transducer and signal conditioner** b. transmission and processing c. Display and processing d. signal conditioner and transmission e. none of the previous

13. Piezoelectric transducer has the following values: voltage sensitivity = 0.02 V.m/N, thickness = 10mm is used to measure static pressure. If the generated voltage was 10 Volt, what would be the value of pressure

- a. 100 kPa **b. 50 kPa** c. 25 kPa d. 10 kPa e. none of the previous

14. The galvanometer is a DC measuring device work in which of the following principles

- a. resistive b. capacitive **c. electromagnetic** d. photovoltaic e. none of the previous

15. Which of the following measuring devices has one movable and one fixed plate

- a. DC ammeter b. AC ammeter c. AC voltmeter **d. DC voltmeter** e. none of the previous

16. An experiment produces 5 points of data. What is the maximum order of curve fitting curve can be obtained

- a. 4** b. 5 c. 6 d. 7 e. none of the previous

Problem #2: for the given data

(8marks)

3. Find the standard deviation for Y values
4. Find linear fitting curve equation for Y values

Xi	Yi
1	5
2	8
3	11
4	14
5	17

Solution:- n=5

$$1. Y_m = \frac{5+8+11+14+17}{5} = 11$$

$$\sigma = \sqrt{\frac{1}{n} \sum_{i=1}^n (Y_i - Y_m)^2} = \sqrt{\frac{1}{5} 90} = 4.2$$

$$\text{Or } \sigma = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (x_i - x_m)^2} = \sqrt{\frac{1}{5-1} 90} = 4.74$$

2. Y=ax+b

$$a = \frac{n \sum x_i y_i - (\sum x_i)(\sum y_i)}{n \sum x_i^2 - (\sum x_i)^2} = \frac{(5)(195) - (15)(55)}{(5)(55) - (15)^2} = 3$$

$$b = \frac{(\sum y_i)(\sum x_i^2) - (\sum x_i y_i)(\sum x_i)}{n(\sum x_i^2) - (\sum x_i)^2} = \frac{(55)(55) - (195)(15)}{(5)(55) - (15)^2} = 2$$

$$Y = 3X + 2$$

	Xi	X²i	Yi	(Y_i - Y_m)²	Xi*Yi
	1	1	5	36	5
	2	4	8	9	16
	3	9	11	0	33
	4	16	14	9	56
	5	25	17	36	85
Σ	15	55	55	90	195

Monday 4/1/2016

Second Exam

allowed time: 50 min

Student Name:

Student ID number:

Problem #1: chose the correct answer for the following questions and fill the given table (12mark)

Answer	Question							
	1	2	3	4	5	6	7	8
a								
b								
c								
d								
e								

17. Input circuit is a piece of measurement system found commonly between

- a. signal conditioner and transmission b. transmission and processing c. Display and processing **d. transducer and signal conditioner** e. none of the previous

18. The galvanometer is a DC measuring device work in which of the following principles

- a. resistive b. capacitive **c. electromagnetic** d. photovoltaic e. none of the previous

19. Iron vane is a device used to measure

- a. Alternating current** b. AC voltage c. direct current d. DC voltage e. none of the previous

20. 10 Ampere current passes through 1m length conductor. If 80% of this conductor is located in 5 Webber/m² magnetic flux. Find the generated force between the conductor and the magnetic flux

- a. 50 N b. 20N c. 30N **d. 40N** e. none of the previous

21. Piezoelectric transducer has the following values: voltage sensitivity = 0.10 V.m/N, thickness = 10mm is used to measure static pressure. If the generated voltage was 10 Volt, what would be the value of pressure

- a. 100 kPa b. 50 kPa c. 25 kPa **d. 10 kPa** e. none of the previous

22. An experiment produces 5 points of data. What is the maximum order of curve fitting curve can be obtained

- a. 4** b. 5 c. 6 d. 7 e. none of the previous

23. Which of the following measuring devices has one movable and one fixed plate

- a. DC ammeter b. AC ammeter **c. DC voltmeter** d. AC voltmeter e. none of the previous

24. When we have the case of imprecise points, the curve fitting is called

- a. interpolation **b. regression** c. random d. sinusoidal e. none of the previous

Problem #2: for the given data

(8marks)

5. Find the standard deviation for Y values
6. Find linear fitting curve equation for Y values

Xi	Yi
1	14
2	20
3	26
4	32
5	38

Solution:- $n=5$

$$1. Y_m = \frac{14 + 20 + 26 + 32 + 38}{5} = 26$$

$$\sigma = \sqrt{\frac{1}{n} \sum_{i=1}^n (Y_i - Y_m)^2} = \sqrt{\frac{1}{5} 360} = 8.5$$

$$\text{Or } \sigma = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (x_i - x_m)^2} = \sqrt{\frac{1}{5-1} 360} = 9.5$$

2. $Y=ax+b$

$$a = \frac{n \sum x_i y_i - (\sum x_i)(\sum y_i)}{n \sum x_i^2 - (\sum x_i)^2} = \frac{(5)(450) - (15)(130)}{(5)(55) - (15)^2} = 3$$

$$b = \frac{(\sum y_i)(\sum x_i^2) - (\sum x_i y_i)(\sum x_i)}{n(\sum x_i^2) - (\sum x_i)^2} = \frac{(130)(55) - (450)(15)}{(5)(55) - (15)^2} = 8$$

$$Y = 6X + 8$$

	Xi	X²i	Yi	(Y_i - Y_m)²	Xi*Yi
	1	1	14	144	14
	2	4	20	36	40
	3	9	26	0	78
	4	16	32	36	128
	5	25	38	144	190
Σ	15	55	130	360	450