Surigao City Campus

Bachelor of Science in Electrical Engineering

SURIGAO STATE COLLEGE OF TECHNOLOGY

SSCT

"For Nation's Greater Heights"

I.4. The College/Academic Unit encourages and supports assessment for multiple intelligences.

COLLEGE OF ENGINEERING & INFORMATION TECHNOLOGY
First Semester, AY 2020-2021

TEST QUESTIONNAIRE
Midterm Examination in **Math 114 – Engineering Data Analysis**

Instruction:
1. Read the questions carefully. You are not permitted to share calculators or any other materials during the examination;
2. For problem analysis, show the detailed solution of the problem in a separate sheet of paper;
3. Shade the bubble in the answer sheet that corresponds to the correct answer of the given test question.

Identification:

1. In this method of data collection, an engineer observes the process or population, disturbing it as little as possible, and records the quantities of interest. _____
   Ans. **Observational Study**
2. This sampling method involves the researcher using their judgment to select a sample that is most useful to the purposes of the research._____
   Ans. **Purposive Sampling**
3. This model uses our engineering and scientific knowledge of a phenomenon, but it is not directly developed from our theoretical or first-principles understanding of the underlying mechanism. _____
   Ans. **Empirical Model**
4. In this sampling method, all members of a population has an equal chance of being selected in which bias is avoided. _____
   Ans. **Simple Random Sampling**
5. A selection of all or part of a set of objects, without regard to the order in which objects are selected. _____
   Ans. **Combination**
6. The event consisting of all outcomes that are not in A is called _____.
   Ans. **Complement of A**
7. If the two events A and B have no outcomes in common they are called _____.
   Ans. **Mutually Exclusive or Disjoint**
8. If the set of possible values of a random variable is a discrete set then it is _____.
   Ans. **Discrete**
9. Any rule that associates a number with each outcome in a given sample space S. _____
   Ans. **Random Variable**
10. A trial with only two possible outcomes is used so frequently as a building block of a random experiment that it is called a _____.
    Ans. **Bernoulli Trial**
11. It is the discrete probability distribution of the number of events occurring in a given time period, given the average number of times the event occurs over that time period. _____
    Ans. **Poisson distribution**
12. A random variable which represents some measurement on a continuous scale. _____
    Ans. **Continuous Random Variable**
13. A continuous distribution that is commonly used to measure the expected time for an event to occur. _____.
    Ans. **Exponential Distribution**
14. The individual probability distribution of a random variable in a joint probability distribution is referred to as its _____.
    Ans. **Marginal Probability Distribution**
15. If X and Y are two random variables, the probability distribution that defines their simultaneous behavior is called a _____.
    Ans. **Joint Probability Distribution**

Problem Analysis:

16. How many licensed plates can be made if each plate has 3 different digits followed by 2 different letters?
    a. **468000 plates**
    b. 320000 plates
    c. 543000 plates
    d. 400000 plates

17. A broadway show wants to hire 6 women and 3 men. In how many ways can the choice be made if 9 women and 5 men are available?
    a. 840 ways
    b. 580 ways
    c. 320 ways
    d. 480 ways
18. There is a 30% chance of rain today. If it does not rain today, there is a 20% chance of rain tomorrow. If it rains today, there is a 50% chance of rain tomorrow. What is the probability that it rains tomorrow?
    a. 0.18
    b. 0.21
    c. 0.29
    d. 0.15
19. In a box of 25 external hard disks, there are 2 defectives. An inspector examines 5 of these hard disks. Find the probability that there is at least 1 defective hard disk among the 5.
    a. 0.367
    b. 0.667
    c. 0.076
    d. 0.763
20. In a classroom of 30 students, 3 of the students wear wrist watches. If 14 students are selected *with replacement*, what is the probability that exactly 2 of them wear wrist watches?
    a. 0.257
    b. 0.3586
    c. 0.3223
    d. 0.2924
21. In a classroom of 30 students, 3 of the students wear wrist watches. If 14 students are selected *without replacement*, what is the probability that exactly 2 of them wear wrist watches?
    a. 0.257
    b. 0.3586
    c. 0.3223
    d. 0.2924
22. Find the probability that number 5 appears only once when a fair die is tossed 4 times.
    a. 1/126
    b. 3/4
    c. 1/78
    d. 1/216
23. The pdf of X is f (x) = 0.2, 1 < x < 6. Find P(2 < X < 5).
    a. 1/3
    b. 2/3
    c. 3/5
    d. 2/5
24. Let X be a random variable with pdf f (x) = kx, 0 < x < 4. Find the value of k.
    a. 1/6
    b. 1/8
    c. 2/7
    d. 2/3
25. Let X be a random variable with pdf f (x) = kx, 0 < x < 4. Find *E(X)*.
    a. 8/3
    b. 8/9
    c. 3/8
    d. 1/8
26. It is known that the IQ scores of people in the United States have a normal distribution with mean 100 and standard deviation 15. If a person is selected at random, find the probability that the person's IQ score is less than 85.
    a. 0.1587
    b. 0.0912
    c. 0.1957
    d. 0.7835
27. Suppose the random variables X and Y have joint pdf f (x, y) = 6y, 0 < y < x < 1. Find E(X) and E(Y).
    a. ¾, ½

b. 4/3, ¼
c. ½, ¼
d. 4/3, 1/3

28. Suppose the random variables X and Y have joint pdf f (x, y) = 6y, 0 < y < x < 1. Find Var(X) and Var(Y).
    a. 3/40, 1/30
    b. 1/40, 3/20
    c. 3/80, 1/20
    d. 1/20, 3/60
29. Suppose the random variables X and Y have joint pdf f (x, y) = 6y, 0 < y < x < 1. Find Cov(X, Y).
    a. 1/40
    b. 1/20
    c. 1/30
    d. 1/50
30. You have two lightbulbs for a particular lamp. Let *X*= the lifetime of the first bulb and *Y*= the lifetime of the second bulb (both in 1000s of hours). Suppose that *X* and *Y* are independent and that each has an exponential distribution with parameter $\lambda = 1$. What is the joint pdf of X and Y?
    a. e^{-x-2y} for x≥ 0, y≥ 0
    b. e^{-y} for x≥ 0, y≥ 0
    c. e^{-2x-y} for x≥ 0, y≥ 0
    d. e^{-x-y} for x≥ 0, y≥ 0

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Program Chair, BSEE

COLLEGE OF ENGINEERING & INFORMATION TECHNOLOGY

Second Semester, AY 2021-2022

TEST QUESTIONNAIRE

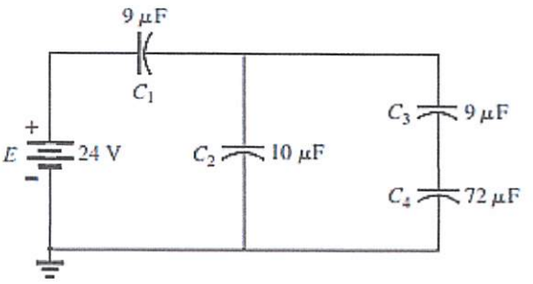
Midterm Examination in **IC 106 – EE Review 2**

Instruction:

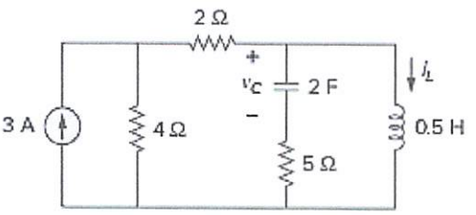
1. Read the questions carefully. You are not permitted to share any other materials during the examination;
2. Show the detailed solution of the problem in a separate sheet of paper;

Problem Analysis:

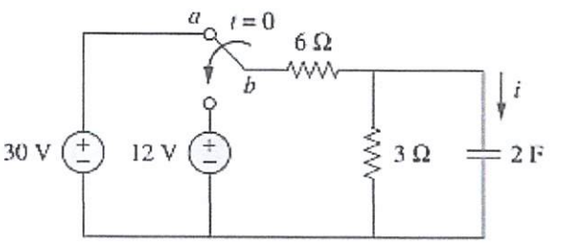
1. Determine the charge on each capacitor.
   a. $Q_1 = 140\ \mu C, Q_2 = 60\ \mu C, Q_3 = 60\ \mu C, Q_4 = 64\ \mu C$
   b. $Q_1 = 144\ \mu C, Q_2 = 80\ \mu C, Q_3 = 64\ \mu C, Q_4 = 64\ \mu C$
   c. $Q_1 = 60\ \mu C, Q_2 = 140\ \mu C, Q_3 = 164\ \mu C, Q_4 = 164\ \mu C$
   d. $Q_1 = 144\ \mu C, Q_2 = 100\ \mu C, Q_3 = 46\ \mu C, Q_4 = 64\ \mu C$



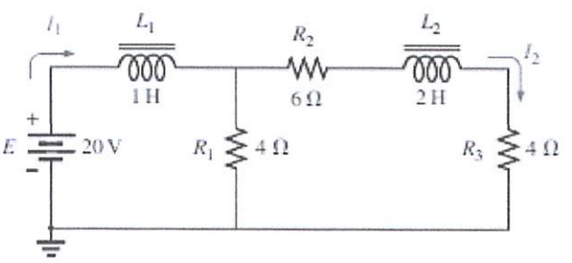
2. Find v_C and i_L in the capacitor and inductor under dc conditions.
   a. $v_C = 1\ V, i_L = 2\ A$
   b. $v_C = 2\ V, i_L = 1.5\ A$
   c. $v_C = 0\ V, i_L = 2\ A$
   d. $v_C = 3\ V, i_L = 0\ A$



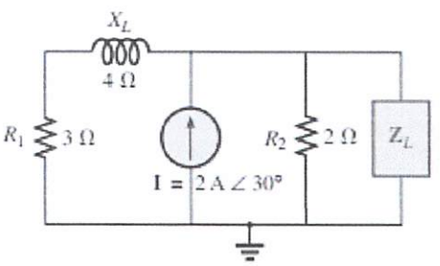
3. Find the energy stored in the capacitor and inductor under dc in problem 2.
   a. $w_L = 0\ J, w_C = 1\ J$
   b. $w_L = 1.5\ J, w_C = 0.5\ J$
   c. $w_L = 0\ J, w_C = 1.5\ J$
   d. $w_L = 1\ J, w_C = 0\ J$
4. The switch has been in position *a* for a long time. At $t = 0$, it moves to position *b*. Calculate $i(t)$ for all $t > 0$.
   a. $-3e^{-0.25t}\ A$
   b. $6e^{0.25t}\ A$
   c. $-3e^{-.25t}\ A$
   d. $8e^{-0.25t}\ A$



5. Find the steady-state currents I_1 and I_2 for the network shown.
   a. $I_1 = 3\ A, I_2 = 7\ A$
   b. $I_1 = 6\ A, I_2 = 2.5\ A$
   c. $I_1 = 7\ A, I_2 = 2\ A$
   d. $I_1 = 3.5\ A, I_2 = 6\ A$

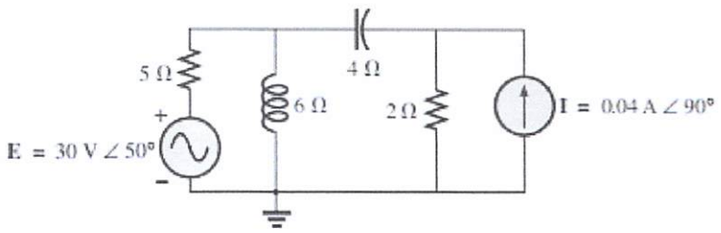


6. Find the load impedance Z_L for the network shown for maximum power to the load.
   a. $1.26\angle 17°\ \Omega$
   b. $1.56\angle 14.47°\ \Omega$
   c. $2.10\angle 10.74°\ \Omega$
   d. $1.65\angle 17.74°\ \Omega$



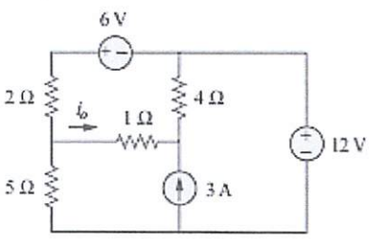
7. Find the maximum power to the load in problem 6.
   a. 2 W
   b. 2.16 W
   c. 1.60 W
   d. 1.61 W

8. Two coils connected in series-aiding fashion have a total inductance of 500 mH. When connected in a series-opposing configuration, the coils have a total inductance of 300 mH. If the inductance of one coil (L_1) is three times the other, find L_1, L_2, and M.
   a. 300 mH, 100 mH, 50 mH
   b. 350 mH, 150 mH, 40 mH
   c. 250 mH, 55 mH, 150 mH
   d. 210 mH, 120 mH, 60 mH
9. What is the coupling coefficient in problem 8?
   a. 0.2887
   b. 0.2337
   c. 0.3662
   d. 0.2777
10. Determine the nodal voltages for the network shown.



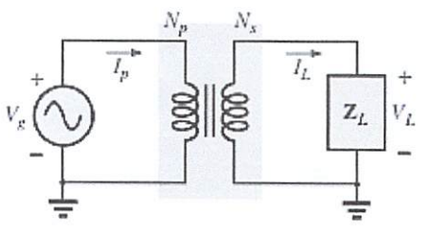
   a. $V_1 = 20.11\angle 43.5°$ V, $V_2 = 6.48\angle 100.5°$ V
   b. $V_1 = 18.66\angle 44.8°$ V, $V_2 = 3.44\angle 98.6°$ V
   c. $V_1 = 19.78\angle 43.8°$ V, $V_2 = 8.50\angle 132.9°$ V
   d. $V_1 = 19.86\angle 43.8°$ V, $V_2 = 8.94\angle 106.9°$ V

11. Use mesh analysis to obtain i_o in the circuit shown below.



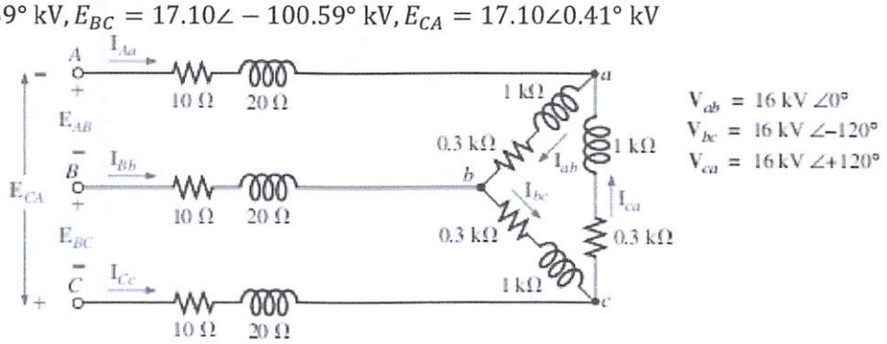
   a. 1.363 A
   b. 2.473 A
   c. −1.132 A
   d. −1.733 A

12. If V_L = 240 V, Z_L = 20 Ω resistor, I_p = 0.05 A, and N_s = 50, find the number of turns in the primary circuit of the iron core transformer.



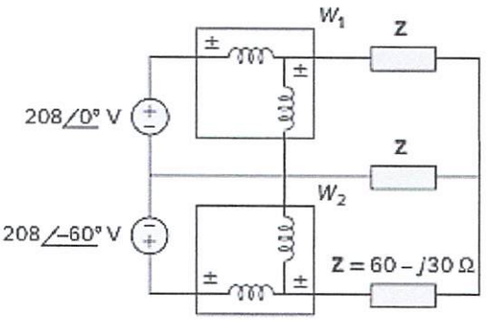
   a. 5000 turns
   b. 10,000 turns
   c. 12000 turns
   d. 2,000 turns

13. For the Δ-connected load, find the magnitude and angle of each phase current $\mathbf{I}_{ab}$, $\mathbf{I}_{bc}$, and $\mathbf{I}_{ca}$.
   a. $I_{ab} = 15.33\angle -46.30°, I_{bc} = 15.33\angle -193.30°, I_{ca} = 15.33\angle 73.30°$
   b. $I_{ab} = 15.33\angle -73.30°, I_{bc} = 15.33\angle -193.30°, I_{ca} = 15.33\angle 46.7°$
   c. $I_{ab} = 17.25\angle -73.30°, I_{bc} = 17.25\angle 193.30°, I_{ca} = 17.25\angle -37.7°$
   d. $I_{ab} = 15.55\angle 73.30°, I_{bc} = 15.55\angle 193.30°, I_{ca} = 15.55\angle -70.4°$
14. Calculate the magnitude and angle of each line current $\mathbf{I}_{Aa}$, $\mathbf{I}_{Bb}$, and $\mathbf{I}_{Cc}$.
   a. $I_{Aa} = 16.55\angle -133.30°, I_{Bb} = 16.55\angle 136.30°, I_{Cc} = 16.55\angle -136.70°$
   b. $I_{Aa} = 26.33\angle 133.30°, I_{Bb} = 26.33\angle 106.30°, I_{Cc} = 26.33\angle -76.70°$
   c. $I_{Aa} = 16.55\angle 103.30°, I_{Bb} = 16.55\angle 106.70°, I_{Cc} = 16.55\angle 136.70°$
   d. $I_{Aa} = 26.55\angle -103.30°, I_{Bb} = 26.55\angle 136.70°, I_{Cc} = 26.55\angle 16.70°$
15. Determine the magnitude and angle of the voltages $\mathbf{E}_{AB}$, $\mathbf{E}_{BC}$, and $\mathbf{E}_{CA}$.
   a. $E_{AB} = 10.17\angle 10.59°$ kV, $E_{BC} = 10.17\angle 125.59°$ kV, $E_{CA} = 10.17\angle -129.41°$ kV
   b. $E_{AB} = 16.21\angle -102.59°$ kV, $E_{BC} = 16.21\angle 10.59°$ kV, $E_{CA} = 16.21\angle -9.41°$ kV
   c. $E_{AB} = 17.01\angle -0.59°$ kV, $E_{BC} = 17.01\angle -120.59°$ kV, $E_{CA} = 17.01\angle 119.41°$ kV
   d. $E_{AB} = 17.10\angle 20.59°$ kV, $E_{BC} = 17.10\angle -100.59°$ kV, $E_{CA} = 17.10\angle 0.41°$ kV



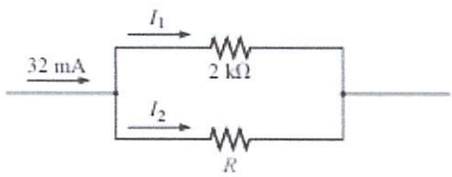
For numbers 13, 14, and 15

16. Predict the wattmeter reading W_2 for the circuit shown.
    a. 318.48 W
    b. 208.98 W
    c. 218.65 W
    d. 371.65 W

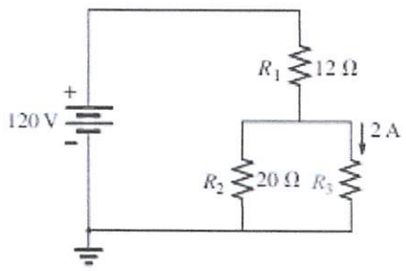


17. A parallel *RLC* circuit has the following values: R = 60 Ω , L = 1 mH, and C = 50 μF. Find the quality factor, the resonant frequency, and the bandwidth of the *RLC* circuit.
    a. $Q = 20.25, B = 364.88\frac{\text{rad}}{\text{s}}, \omega_0 = 4.56\frac{\text{krad}}{\text{s}}$
    b. $Q = 14.23, B = 523.23\frac{\text{rad}}{\text{s}}, \omega_0 = 43.72\frac{\text{krad}}{\text{s}}$
    c. $Q = 13.42, B = 333.33\frac{\text{rad}}{\text{s}}, \omega_0 = 4.472\frac{\text{krad}}{\text{s}}$
    d. $Q = 15.42, B = 143.8\frac{\text{rad}}{\text{s}}, \omega_0 = 43.22\frac{\text{krad}}{\text{s}}$

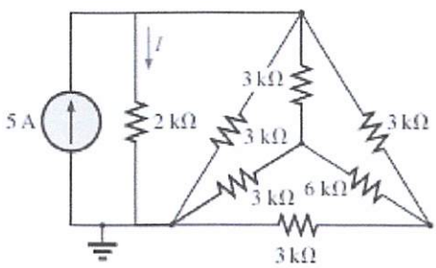
18. Find resistor R for the network shown that will ensure that I_1=3I_2.
    a. 3 kΩ
    b. 8 kΩ
    c. 9 kΩ
    d. 6 kΩ



19. For the network shown, find the resistance R_3 if the current through it is 2 A.
    a. 30 Ω
    b. 40 Ω
    c. 35 Ω
    d. 20 Ω



20. Determine the current *I*.
    a. 4.10A
    b. 2.14 A
    c. 2.10 A
    d. 1.14 A



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SURIGAO STATE COLLEGE OF TECHNOLOGY

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COLLEGE OF ENGINEERING AND INFORMATION TECHNOLOGY

TABLE OF SPECIFICATION

FINAL

First Sem., A.Y. 2021-2022

ES 135 - DYNAMICS OF RIGID BODIES

Topics	Time Frame (hr)	Weight Percentage	Item Number						Total No. of Items
			Remembering 20%	Understanding 20%	Applying 0%	Analyzing 40%	Evaluating 20%	Creating 0%	
1. Planar Kinematics of Rigid Bodies	5	31%		3, 4, 5		1, 2, 6			6
2. Planar Kinetics of a Rigid Body: Forces and Acceleration	5	31%	7, 10			11, 12	8, 9		6
3. Planar Kinetics of a Rigid Body: Energy and Momentum Methods	6	38%	18, 19	20		15, 16, 17	13, 14		8
Total	16	100%	4	4	0	8	4	0	20

Prepared by:

ENGR. MARK MARVIN D. PAGLINAWAN
Guest Lecturer

Date: 1-4-2022

Checked by:

ENGR. VICENTE Z. DELANTE, MEng'g
Program Chair

Date: 1-5-2022

Approved by:

ENGR. ROBERT R. BACARRO, MECE, MBA
Dean

Date: 1-5-2022

To compute the weight percentage per topic: Divide the number of hours by the total hours times 100.
To determine the number of items per topic: Multiply the corresponding weight by the total number of items. (Items should be distributed to the different levels)

SURIGAO STATE COLLEGE OF TECHNOLOGY

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COLLEGE OF ENGINEERING AND INFORMATION TECHNOLOGY

TABLE OF SPECIFICATION

MIDTERM

First Sem., A.Y. 2021-2022

Math 114 - Engineering Data Analysis

Topics	Time Frame (hr)	Weight Percentage	Item Number						Total No. of Items
			Remembering 50%	Understanding 0%	Applying 7%	Analyzing 23%	Evaluating 20%	Creating 0%	
1. Obtaining Data	3	13%	1, 2, 3, 4						4
2. Probability	5	21%	5, 6, 7		18	16, 17			6
3. Discrete Random Variables and Probability Distributions	6	25%	8, 9, 10, 11		19	20, 21, 22			8
4. Continuous Random Variables and Probability Distributions	5	21%	12, 13			26	23, 24, 25		6
5. Joint Probability Distributions	5	21%	14, 15			30	27, 28, 29		6
Total	24	100%	15	0	2	7	6	0	30

Prepared by:

ENGR. MARK MARVIN D. PAGLINAWAN
Guest Lecturer

Date: 1-5-2022

Checked by:

ENGR. VICENTE DELANTE, MEng'g
Program Chair

Date: 1-6-2022

Approved by:

ENGR. ROBERT R. BACARRO, MECE, MBA
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Date: 1-6-2022

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COLLEGE OF ENGINEERING AND INFORMATION TECHNOLOGY

TABLE OF SPECIFICATION

FINAL

First Sem., A.Y. 2021-2022

Math 114 - Engineering Data Analysis

Topics	Time Frame (hr)	Weight Percentage	Item Number						Total No. of Items
			Remembering 48%	Understanding 0%	Applying 24%	Analyzing 12%	Evaluating 16%	Creating 0%	
1. Point Estimation of Parameters and Sampling Distributions	4	16%	1, 2, 3		4				4
2. Statistical Intervals for a Single Sample	5	20%	5			8, 9	6, 7		5
3. Tests of Hypotheses for a Single Sample	6	24%	10, 11, 12, 13		15	14			6
4. Statistical Inference of Two Samples	5	20%	16, 17		18		19, 20		5
5. Simple Linear Regression and Correlation	5	20%	21, 22		23, 24, 25				5
Total	25	100%	12	0	6	3	4	0	25

Prepared by:

ENGR. MARK MARVIN D. PAGLINAWAN
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Date: 1-5-2022

Checked by:

ENGR. VICENTE DELANTE, MEng'g
Program Chair

Date: 1-6-2022

Approved by:

ENGR. ROBERT R. BACARRO, MECE, MBA
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COLLEGE OF ENGINEERING AND INFORMATION TECHNOLOGY

TABLE OF SPECIFICATION

MIDTERM

Second Sem., A.Y. 2020-2021

EE 304 - Electrical Apparatus and Devices

Topics	Time Frame (hr)	Weight Percentage	Item Number						Total No. of Items
			Remembering 35%	Understanding 38%	Applying 0%	Analyzing 0%	Evaluating 27%	Creating 0%	
1. Transformer Fundamentals	6	40%	18,25,26,42	12,14,19,37,43,44,52			4,5,10,13,20,31,35,39,41,54,55		22
2. Transformer Connections	5	33%	11,22,23,33,34,36,49	2,7,8,9,30,50			45,46,47,51		18
3. Various Types of Transformers and Their Applications	4	27%	15,16,17,27,29,32,38,40	1,3,6,21,24,28,48,53					15
Total	15	100%	19	21	0	0	15	0	55

Prepared by:

ENGR. VERNON V. LIZA
Guest Lecturer

Date: 3-28-2022

Checked by:

ENGR. VICENTE DELANTE, MEng'g
Program Chair

Date: 3-29-2022

Approved by:

ENGR. ROBERT R. BACARRO, MECE, MBA
Dean

Date: 3-29-2022

To compute the weight percentage per topic: Divide the number of hours by the total hours times 100.
To determine the number of items per topic: Multiply the corresponding weight by the total number of items. (Items should be distributed to the different levels)

SURIGAO STATE COLLEGE OF TECHNOLOGY

"For Nation's Greater Heights"

COLLEGE OF ENGINEERING AND INFORMATION TECHNOLOGY

TABLE OF SPECIFICATION

FINAL

First Sem., A.Y. 2021-2022

MATH 113 - DIFFERENTIAL EQUATIONS

Topics	Time Frame (hr)	Weight Percentage	Item Number						Total No. of Items
			Remembering 0%	Understanding 7%	Applying 0%	Analyzing 7%	Evaluating 86%	Creating 0%	
1.LINEAR DIFFERENTIAL EQUATION OF ORDER n	5.5	27%		1			2,3,4		4
2. HOMOGENEOUS LINEAR D.E. WITH CONSTANT COEFFICIENTS	3	15%					5, 6		2
3. NON-HOMOGENEOUS LINEAR D.E. WITH CONSTANT COEFFICIENTS	4	20%					8, 9, 10		3
4. LAPLACE TRANSFORMS OF FUNCTIONS	8	39%				15	7, 11, 12, 13, 14		6
Total	20.5	100%	0	1	0	1	13	0	15

Prepared by:

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Date: 1-4-2022

Checked by:

ENGR. VICENTE Z. DELANTE, MEng'g
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Date: 1-5-2022

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Dean

Date: 1-5-2022

To compute the weight percentage per topic: Divide the number of hours by the total hours times 100.
To determine the number of items per topic: Multiply the corresponding weight by the total number of items. (Items should be distributed to the different levels)

SURIGAO STATE COLLEGE OF TECHNOLOGY

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COLLEGE OF ENGINEERING AND INFORMATION TECHNOLOGY

TABLE OF SPECIFICATION

MIDTERM

First Sem., A.Y. 2019-2020

EE 101 - CIRCUITS 1

Topics	Time Frame (hr)	Weight Percentage	Item Number						Total No. of Items
			Remembering 0%	Understanding 0%	Applying 27%	Analyzing 71%	Evaluating 0%	Creating 0%	
1. BASIC ELECTRICAL QUANTITIES SYSTEM OF UNITS; CIRCUIT COMPONENTS	3	13%				5			1
2. OHM'S LAW AND KIRCHOFF'S LAW	4	17%				9, 11			2
3. ANALYSIS OF SERIES, PARALLEL, SERIES-PARALLEL CIRCUITS	4	17%			7	1			2
4. APPLICATION OF RESISTIVE CIRCUITS	4	17%			8, 10				2
5. ANALYSIS OF RESISTIVE CIRCUITS WITH CONTROLLED SOURCES	4	17%				2, 3			2
6. CIRCUIT ANALYSIS TECHNIQUES AND NETWORK THEOREMS	5	21%				4, 6			2
Total	24	100%	0	0	3	8	0	0	11

Prepared by:

VERNON V. LIZA
Guest Lecturer

Date: Oct. 4, 2019

Checked by:

ENGR. JOSELITO S. BALDAPAN, PEE
Program Chair

Date: Oct. 4, 2019

Approved by:

ENGR. ROBERT R. BACARRO, MECE, MBA
Dean

Date: Oct. 4, 2019

To compute the weight percentage per topic: Divide the number of hours by the total hours times 100.
To determine the number of items per topic: Multiply the corresponding weight by the total number of items. (Items should be distributed to the different levels)

SURIGAO STATE COLLEGE OF TECHNOLOGY

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COLLEGE OF ENGINEERING AND INFORMATION TECHNOLOGY

TABLE OF SPECIFICATION

FINAL

First Sem., A.Y. 2019-2020

EE 101 - CIRCUITS 1

Topics	Time Frame (hr)	Weight Percentage	Item Number						Total No. of Items
			Remembering 0%	Understanding 0%	Applying 22%	Analyzing 67%	Evaluating 11%	Creating 0%	
1. FUNDAMENTALS OF INDUCTORS AND CAPACITORS	8	32%			8	4, 5			3
2. ANALYSIS OF FIRST ORDER DYNAMIC CIRCUITS WITH DC EXCITATION	8	32%				1, 2	7		3
3. ANALYSIS OF SECOND ORDER DYNAMIC CIRCUITS WITH DC EXCITATION	9	36%			9	3, 6			3
Total	25	100%	0	0	2	6	1	0	9

Prepared by:

VERNON V. LIZA
Guest Lecturer

Date: Oct. 4, 2019

Checked by:

ENGR. JOSELITO S. BALDAPAN, PEE
Program Chair

Date: Oct. 4, 2019

Approved by:

ENGR. ROBERT R. BACARRO, MECE, MBA
Dean

Date: Oct. 7, 2019

To compute the weight percentage per topic: Divide the number of hours by the total hours times 100.

To determine the number of items per topic: Multiply the corresponding weight by the total number of items. (Items should be distributed to the different levels)

COLLEGE OF ENGINEERING AND INFORMATION TECHNOLOGY
City Campus
Second Semester, Academic Year 2021-2022

Outcomes Based-Education (OBE) Syllabus in MATH 161
ENGINEERING MATH FOR EE
Course Credit: 3.0 units **(54hrs)**

Institutional Vision, Mission, and Goals

Vision:
An innovative and technologically-advanced State College in Caraga.

Mission:
To provide relevant,

a. high quality and sustainable instruction,
b. research, production and extension programs and
c. services within a culture of credible and responsive institutional governance.

Goals:

1. Foster application of the discipline and provide its learner with industry-based training and education particularly in engineering, technology and fisheries.
2. Conduct and utilize studies for the development of new products, systems and services relevant to Philippine life and of the global village.
3. Promote transfer of technology and spread useful technical skills, thus empowering its learners and their activities.

SSCT Core Values

Service-Oriented Socially Responsive Committed Transformational

SSCT Quality Policy

Surigao State College of Technology provides quality instruction, research, extension programs and production services to satisfy its customers by responding to their needs and expectations and continually improving its quality management system.

Institutional Graduate Attributes (IGA) :

- Visionary Leader
- Effective Communicator
- Competent Technologist
- Self-Directed Lifelong Learner

Program Goals

The Electrical Engineering program aims to design and apply the generation, transmission, and distribution of electrical energy to produce competent engineers that exhibit positive work ethics and flexibility in work conditions for the development of Caraga.

ProgramEducational Objectives (PEO) and Relationship to Institutional Mission

Program Educational Objectives (PEO)	Mission		
	a	b	c
EE-PEO1. Demonstrate professionalism in electrical engineering and apply professional ethics thru communication and collaboration.	✓	✓	✓
EE-PEO2. Use appropriate techniques, resources, and modern tools necessary for analysis, design, and modeling of complex electrical systems	✓	✓	✓
EE-PEO3. Plan, lead, and implement designated tasks, interact with other engineering professionals, and take leadership roles in electrical engineering organization.	✓	✓	✓
EE-PEO4. Engage in lifelong learning able to discover new opportunities for continuing personal and professional development in electrical engineering	✓	✓	✓

Program Outcomes (PO) and Relationship to Program Educational Objectives (PEO)

Program Outcomes (PO)	Program Educational Objectives (PEO)			
	1	2	3	4
EE-POa.Apply knowledge of mathematics and sciences to solve complex engineering problems	✓	✓	✓	✓
EE-POb.Develop and conduct appropriate experimentation, analyze and interpret data				
EE-POc.Design a system, component, or process to meet desired needs within				

realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, in accordance with standards				
EE-POd.Function effectively on multi-disciplinary and multi-cultural teams that establish goals, plan tasks, and meet deadlines				
EE-POe.Identify, formulate, and solve complex problems in electrical engineering	✓	✓	✓	✓
EE-POf.Recognize ethical and professional responsibilities in engineering practice				
EE-POg.Communicate effectively with a range of audiences				
EE-POh.Understand the impact of engineering solutions in a global, economic, environmental, and societal context				
EE-POi.Recognize the need for additional knowledge and engage in lifelong learning				
EE-POj.Articulate and discuss the latest developments in the field of electrical engineering				
EE-POk.Apply techniques, skills, and modern engineering tools necessary for electrical engineering practice	✓	✓	✓	✓
EE-POl.Demonstrate knowledge and understanding of engineering and management principles as a member and/or leader in a team to manage projects in multidisciplinary environments				

Course Description

The study of mathematical methods for solving engineering problems such as complex number, complex variables, CauchyRiemann equations, Laplace transformation and Laplace transform analysis, Fourier series and Fourier transform, z transform, power series solutions of ordinary differential equations, partial differential equation, and hypergeometricequations such as Legendre and Bessel functions.

DACUM Main Duties (DMD)

EE-DMD1. Diagnose electrical problems using the electrical diagrams or blue print (as built electrical plans)
EE-DMD2. Install, repair, and maintenance electrical power systems(building wiring, controls, electrical machines and transformers)
EE-DMD3. Facilities Manager
EE-DMD4. Power Plant Manager
EE-DMD5. Electrical Researchers, Professor and Faculty

Course Outcomes (CO) and Relationship to Program Outcomes (PO)

Program Outcome (PO) /Level	Course Outcomes (CO)	Assessment Task (CO-AT)	DACUM Links				
			1	2	3	4	5
EE-POa Demonstrating Apply knowledge of mathematics and sciences to solve complex engineering problems	*MATH161-CO1*: Apply mathematics technique to solve complex engineering problems	StudentsApply knowledge of mathematics and sciences to solve complex engineering problems Criteria – 70% correct answers and solutions Total Points: 100 points					✓
EE-Poe Enabling Identify, formulate, and solve complex problems in electrical engineering.	*MATH161-CO2*: Solve complex number, complex variables, Laplace transformation and Laplace transform analysis, Fourier series and Fourier transform, z transform, power series solutions of ordinary differential equations, partial differential equation, and hypergeometric equations.	Students can solve complex number, complex variables, Laplace transformation and Laplace transform analysis, Fourier series and Fourier transform, z transform, power series solutions of ordinary differential equations, partial differential equation, and hypergeometric equations. Criteria – 70% correct answers and solutions Total Points: 100 points					✓
EE-POk Introductory Apply techniques, skills, and modern engineering tools necessary for electrical engineering	*MATH161-CO3*: Apply techniques and modern engineering tools to solve electrical engineering practice.	Students use modern engineering application to solve electrical engineering problems Criteria – 70% correct answers					✓

practice		Total Points: 100 points					

Course Outcomes (CO) and Relationship to Intended Learning Outcomes (ILO)

Course Outcomes (CO)	Intended Learning Outcomes (ILO)
MATH161-CO1: Apply mathematics technique to solve complex engineering problems	MATH161-ILO2: Solve complex problems using de Moivre's formula MATH161-ILO6: Apply power series method to solve ordinary differential equations. MATH161-ILO7: Apply a range of techniques to find solutions of standard Partial Differential Equations (PDE)
MATH161-CO2: Solve complex number, complex variables, Laplace transformation and Laplace transform analysis, Fourier series and Fourier transform, z transform, power series solutions of ordinary differential equations, partial differential equation, and hypergeometric equations.	*MATH161-ILO1: Evaluate complex numbers.* *MATH161-ILO2: Solve complex problems using de Moivre's formula* *MATH161-ILO3: Evaluate the Laplace transform of the functions.* *MATH161-ILO4: Solve the Fourier series of the function and evaluate the Fourier transform* *MATH161-ILO5: Evaluate the Z transform of a sequence.* *MATH161-ILO6: Apply power series method to solve ordinary differential equations.* *MATH161-ILO7: Apply a range of techniques to find solutions of standard Partial Differential Equations (PDE)* *MATH161-ILO8: Solve the general equation of the*

	Hypergeometric equation.
MATH161-CO3: Apply techniques and modern engineering tools to perform electrical engineering practice.	*MATH161-ILO2: Solve complex problems using de Moivre's formula* *MATH161-ILO3: Evaluate the Laplace transform of the functions.* *MATH161-ILO4: Solve the Fourier series of the function and evaluate the Fourier transform* *MATH161-ILO5: Evaluate the Z transform of a sequence.* *MATH161-ILO6: Apply power series method to solve ordinary differential equations.* *MATH161-ILO7: Apply a range of techniques to find solutions of standard Partial Differential Equations (PDE)* *MATH161-ILO8: Solve the general equation of the Hypergeometric equation.*

Detailed Course Content

Intended Learning Outcomes (ILO)	Topics	Time Frame	Teaching and Learning Activities(TLA)	Assessment Tasks (ILO-AT)	Target	Resources	Values Integration	Remarks
MATH161-ILO1: Evaluate complex numbers. (MATH161-CO1, MATH161-CO2,) MATH161-ILO2: Solve	1. **COMPLEX NUMBER SYSTEM AND COMPLEX VARIABLES** *1.1. Complex Numbers and Their Geometric*	5.0 hrs.	Learning Module 1 *Asynchronous*	Problem solving quiz on complex number system and complex variables.	70% of the students shall have a rating of at least 3.0	Modules, e-books, textbooks, and worksheets	Core Value: *Committed* Sub-Value: *Determined in learning the basic concepts of*	

complex problems using de Moivre's formula (MATH161-CO1, MATH161-CO2, MATH161-CO3)	*Representation* *1.2. Forms of Complex Numbers* *1.3. Addition and Subtraction of Complex Numbers* *1.4. Multiplication and Division of Complex Numbers* *1.5. Conjugate of Complex Numbers* *1.6. Argand Diagram* *1.7. De Moivre's Theorem*						*complex number system*	
MATH161-ILO3: Evaluate the Laplace transform of the functions. (MATH161-CO2, MATH161-CO3)	**2. THE LAPLACE TRANSFORM** *2.1. Laplace Transform Definition* *2.2. Transforms of simple functions* *2.3. Properties of the*	10.0 hrs.	Learning Module 2 *Asynchronous*	Problem solving quiz on thelaplace transform of the functions	70% of the students shall have a rating of at least 3.0	Videos online, modules, e-books,Multisim software, and worksheets	Core Value: *Committed* Sub-Value: *Determined in learning the laplace transform of functions*	

	Laplace transform 2.4. *Solution of differential equations* 2.5. *Laplace transform application*							
MATH161-ILO4: Solve the Fourier series of the function and evaluate the Fourier transform (MATH161-CO2, MATH161-CO3)	**3. FOURIER SERIES AND FOURIER TRANSFROM** 3.1. *Fourier's theorem* 3.2. *Functions of period 2π* 3.3. *Even and odd functions* 3.4. *Linearity property* 3.5. *The Fourier transform* 3.6. *Properties of the Fourier transform*	10.0 hrs.	Learning Module 3 *Asynchronous*	Problem solving quiz onFourier series and Fourier transform.	70% of the students shall have a rating of at least 3.0	Videos online, modules, e-books,Multisim software, and worksheets	Core Value: *Committed* Sub-Value: *Perseverant in solving fourier series and fourier transform of functions*	
MIDTERM EXAMINATION – 2.0 Hrs.								
MATH161-ILO5: Evaluate the Z transform	**4.** *The Z transform and its application*	7.0 hrs.	Learning Module 4 *Asynchronous*	Problem solving quiz on z	70% of the students	Videos online, modules, e-	Core Value: *Committed*	

of a sequence. (MATH161-CO1, MATH161-CO3)	*4.1. The z transform* *4.2. Properties of the z transform* *4.3. The inverse z transform* *4.4. Engineering Application*			transform and its engineering application.	shall have a rating of at least 3.0	books,Multisim software, and worksheets	Sub-Value: *Determined in learning z transform and its engineering application*	
MATH161-ILO6: Apply power series method to solve ordinary differential equations. (MATH161-CO1, MATH161-CO2, MATH161-CO3)	**5.** *Power series solutions of Ordinary Differential Equations* *5.1. Power Series Method* *5.2. Legendre's Equation* *5.3. Extended Power Series Method: Frobenius Method*	7.0 hrs.	Learning Module 5 *Asynchronous*	Problem solving quiz on power series solutions of PDEs	70% of the students shall have a rating of at least 3.0	Modules, e-books,Multisim software, and worksheets	Core Value: *Commited* Sub-Value: *Determined in learning new methods to solve ODEs*	
MATH161-ILO7: Apply a range of techniques to find solutions of standard Partial Differential Equations	**6.** *Partial Differential Equations* *6.1. Basic Concepts of PDEs*	6.0 hrs.	Learning Module 6 *Asynchronous*	Problem solving quiz on Partial Differential Equation.	70% of the students shall have a rating of at least 3.0	Modules, e-books,Multisim software, and worksheets	Core Value: *Committed* Sub-Value: *Perseverant*	

(PDE) (MATH161-CO1, MATH161-CO2, MATH161-CO3)	6.2. Solution by Separating Variables. Use of Fourier Series						*in solving partial differential equations*	
MATH161-ILO8: Solve the general equation of the Hypergeometric equation. *(MATH161-CO1, MATH161-CO3)*	**7.** *Hypergeometric equations and their applications* *7.1. Guass'sHypergeometric Equation* *7.2. General solution at the regular point x = 0* *7.3. General solution of GHE at the regular point x = 1:*	5 hrs.	Learning Module 7 Asynchronous	Problem solving quiz on general solutions of Hypergeometric equation.	70% of the students shall have a rating of at least 3.0	Modules, e-books, Multisim software, and worksheets	Core Value: Committed Sub-Value: Dedicated in finding the general solutions of hypergeometric equations.	
FINAL EXAMINATION – 2.0 Hrs.								

References:

Textbooks
Erwin Kreyszig, Herbert Kreyszig, Edward J. Norminton, *Advance Engineering Mathematics*, 10th Ed. JOHN WILEY & SONS, INC., 2011.
Glyn James, David Burley &et.al., Advance Engineering Mathematics, 4th Ed. Pearson Education Limited., 2011

Course Requirements:

- Problem Sets(CO-AT1)
- Problem Sets(CO-AT2)
- Problem Sets(CO-AT3)
- Quizzes and Assignments
- Midterm and Final exams

Course Evaluation:

Criteria	Lecture Grade
➢ Quizzesand online outputs/interaction (ILO-AT)	25%
➢ Performance Tasks (CO-AT)	35%
➢ Major Exams (Midterm and Final)	40%
TOTAL	**100%**

Grade Computation: $\frac{Midterm\ Grade + Final\ Grade}{2} = Average\ Grade$

Grade Point	Description
1.0	Excellent
1.5 – 1.1	Very Good
2.0 – 1.6	Highly Satisfactory
2.5 – 2.1	Good
2.9 – 2.6	Satisfactory
3.0	Passing
5.0	Failed due to poor performance, absences, withdrawal without notice
DRP	Dropped with approved dropping slip
INC	Incomplete requirements but w/ passing class standing. INC is for non-graduating students only
NG	No Grade

Source: *SSCT Student Handbook*

Course Policies:

1. Attendance shall be checked in every class session in the Google Meet. This is to monitor the absences incurred by the students in terms of the allowable number of absences for a course as stipulated in the Student Handbook.
2. During online classes, video camera shall be turned on all the time and microphone shall be turned off. The microphone shall be unmuted only if the student's name is called to participate in class discussion.
3. Major examinations in multiple-choice type shall be done online. For problem solving type, detailed solutions shall be written legibly in separate sheets of paper and shall be converted to pdf form prior to submission.
4. Cheating in major examinations which include attempts to defraud, deceive, or mislead the instructor in arriving at an honest assessment shall entail zero score.
5. Plagiarism which is a form of cheating that involves presenting the ideas or work of another as one's own work shall entail zero score.
6. Projects shall be submitted on or before the deadline. Students who submit unsatisfactory projects shall be given the chance to improve their works on the condition that they resubmit the revised outputs on the date set by the instructor. Non-submission of a project on the deadline shall entail zero score.

7. An INC grade shall be given to students who fail to submit the course requirements of at least 95% of the projects and quizzes or failure to take the major examinations.

Revision History:

Revision No.	Revised by	Date of Revision	Date of Implementation	Highlight of Revision
1	Engr. Vernon V. Liza	August 2019	August 2019	Followed OBTL Format as per CMO #101 S. 2017
2	Engr.Mark Marvin D. Paglinawan	July 19, 2021	August 23, 2021	DACUM Workshop vis-à-vis CMO No. 101 S. 2017

Prepared by:

ENGR. MARK MARVIN D. PAGLINAWAN
Guest Lecturer

Date: 1/25/2022

Checked and reviewed by:

ENGR. VICENTE Z. DELANTE,MEng'g
Program Chair, BSEE

Date: 1/28/2022

Noted by:

ENGR. ROBERT R. BACARRO, MECE, MBA
Dean, COLLEGE

Date: 1/28/2022

Recommended by:

RONITA E. TALINGTING, PhD
Campus Director

Date: 1/31/2022

Approved by:

EMMYLOU A. BORJA, EdD
VP for Academic Affairs

Date: 1/31/2022