EEE 2B

Reg.No.:								

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 8023

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023
Seventh Semester
Electrical and Electronics Engineering
U19EE727 – EMBEDDED SYSTEM
(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	What are all the characteristics of embedded system?	2	K2	CO1
2.	Justify the need for register in embedded processor.	2	K2	CO1
3.	Mention few serial bus communication protocols.	2	K1	CO2
4.	List the features of CAN bus.	2	K1	CO2
5.	How non maskable interrupt call is answered by embedded processor?	2	K2	CO3
6.	Define multithreading.	2	K1	CO3
7.	Differentiate multiprocessing and multitasking.	2	K2	CO4
8.	What are the functions of RTOS?	2	K1	CO4
9.	Mention one application of embedded processor in ATM machine.	2	K3	CO5
10.	How latch is employed in a processor with respect to washing machine?	2	K4	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Explain about structural units in embedded systems	13	K2	CO1
		(OR)			
	b)	Discuss in detail about power source and memory devices in an embedded processor.	13	K2	CO1
12.	a)	Explain with all necessary sketches to enable serial communication using I^2C bus.	13	K2	CO2
		(OR)			
	b)	Discuss about wireless and mobile system protocols.	13	K2	CO2
13.	a)	What is latency? Elaborate about interrupt driven input and output	13	K2	CO3
		(OR)			
	b)	Differentiate preemptive and non-preemptive multitasking. Explain non-preemptive multitasking.	13	K2	CO3
14.	a)	Explain how the interrupt routines are handled by RTOS and illustrate the features of VxWorks.	13	K2	CO4
		(OR)			
	b)	Explain the features and scheduling algorithm used in RTOS.	13	K2	CO4
15.	a)	Explain about embedded system application in smart card system.	13	K3	CO5
		(OR)			
	b)	Explain about embedded system application in electric vehicle automotive.	13	K3	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Draw the functional block diagram of digital camera and explain about the function of embedded processor in the above system.	15	K3	CO5
		(OR)			
	b)	Explain the operation of ATM machine with respect to embedded processor and write program for basic ATM applications.	15	K4	CO3

COLLEGE OF ENGINEERING FOR WOMEN
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XQB-227

Reg.No.:								

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 8017

B.E. / B.Tech DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023
Seventh Semester
Electrical and Electronics Engineering
U19EE726 – DIGITAL SIGNAL PROCESSING
(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Differentiate between an Energy and power signal along with the mathematical representations	2	K2	CO1
2.	Check the causality and stability of the system i. $y(n) = x(n) - 3x(n-2) + x(n+3)$ ii. ii) $x(n+3) = y(n+2) - y(n-1) - y(n)$	2	K3	CO1
3.	Obtain the circular convolution of the sequence {2, 1, 2, 1} and {1, 2, 3, 4} in matrix method	2	K3	CO2
4.	What is the effect of quantization of filter coefficients in digital filters?	2	K1	CO2
5.	Perform the circular convolution of the following two sequences: $x_1(n) = \{2, 1, 2, 1\}$ $x_2(n) = \{1, 2, 3, 4\}$	2	K3	CO3
6.	State Discrete Fourier Transform (DFT) and its properties	2	K1	CO3
7.	What are the methods used to prevent overflow in digital filter implementations?	2	K1	CO4
8.	Which are the desirable characteristics of windows?	2	K1	CO4
9.	List the Instruction sets of TMS320C24x DSP Controller?	2	K1	CO5
10.	Compare the fixed point and floating point arithmetic	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Obtain the inverse z-transform by partial fraction method $$X(z) = \frac{z+2}{2z^2 - 7z + 3}$$ If the ROCs are i. $\|z\| > 3$ ii. $\|z\| < 1/2$ iii. $1/2 < \|z\| > 3$	13	K3	CO1
		(OR)			
	b)	Explain about the quantization error and Nyquist rate.	13	K2	CO1
12.	a)	i. Compute the convolution of signals using overlap add method, x(n)={3, -1, 0, 1, 3, 2, 0, 1, 2, 1} and h(n) = {1, 1, 1}.	5	K3	CO2
		ii. Find the z transform and ROC of the signal $$x(n) = [3(2^n) - 4(3^n)]\, u(n)$$	8		
		(OR)			
	b)	Find the z-Transform and ROC of the following sequence $$x(n) = \left(-\frac{1}{3}\right)^n u(n) - \left(\frac{1}{2}\right)^n u(-n-1)$$	13	K3	CO2
13.	a)	i. Use circular convolution to evaluate the response of the system represented by the frequency response function $H(e^{j\omega}) = 0.25 + 3e^{-j\omega} + 4e^{-2j\omega} + e^{-j3\omega} + 0.5e^{-j4\omega} + 2e^{-j5\omega}$, when the input of the system is $x(n) = 2n+3$, $0 \le n \le 4$.	4	K3	CO3
		ii. Use the result in (i) to determine the 8-point IDFT of the product of the 8-point DFTs of the impulse response of the system and input.	9		
		(OR)			
	b)	Calculate the 8-point DFT of x[n] using Decimation in Frequency FFT Algorithm. x[n]= {0, 1, 2, 3, 4, 5, 6, 7}	13	K3	CO3
14.	a)	Design a high pass filter with a frequency response using Hanning window with N=7 $$H(e^{jw}) = 1; \frac{\pi}{6} \le |w| \le \pi$$ $= 0$, otherwise.	13	K6	CO4
		(OR)			

	b)	Design and realize an analog Butterworth low pass filter that has a -2db attenuation at a frequency of 20rad/sec and atleast -10db stop band attenuation at 30rad/sec using Bilinear Transformation for T=1sec.	13	K6	CO4
15.	a)	Discuss about any TEN Accumulator, arithmetic, and logic instructions of TMS 320 C24x DSP Processor with examples	13	K2	CO5
		(OR)			
	b)	What are the elements in the control unit of TMS 320 C24x DSP Processor?	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Explain any one application of Butterworth approximations with example.	15	K6	CO4
		(OR)			
	b)	Explain TMS320C Fixed point DSP-based measurement system in real-time.	15	K6	CO5

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Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 8027

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023
Seventh Semester
Electrical and Electronics Engineering
U19EEE17– WIND AND SOLAR ENERGY SYSTEMS
(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Write the demerits of conventional energy sources.	2	K1	CO1
2.	What do you mean by global climate change? Write the causes for the same.	2	K1	CO1
3.	Infer the principle of aerodynamics in wind energy conversion system.	2	K2	CO2
4.	Interpret the various types of control systems for the wind turbine.	2	K2	CO2
5.	Evaluate the given statement: "Solar PV system does not produce output during cloudy days"	2	K5	CO3
6.	Identify the applications of solar PV energy.	2	K3	CO3
7.	Select the inverters that can be used in wind energy system.	2	K3	CO4
8.	Name the parameters required to select the battery for the solar PV system.	2	K2	CO4
9.	Illustrate the grid connected renewable energy system for solar and wind.	2	K2	CO5
10.	Write the technical requirements of Indian Grid Code.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	Compare the performance of different conventional energy resources.	7	K4	CO1
		ii.	Explain about the need of developing renewable energy system in Indian energy market.	6	K2	CO1
			(OR)			
	b)		Identify the renewable energy systems for constructing hybrid energy system. Explain the working of the hybrid system.	13	K2	CO1
12.	a)		Explain the working of wind energy system with necessary diagrams.	13	K2	CO2
			(OR)			
	b)	i.	Examine the performance characteristics of wind turbines and draw the necessary electrical characteristics.	7	K4	CO2
		ii.	Develop the expression for the power contained in the wind.	6	K2	CO2
13.	a)	i.	Explain the working of any two solar energy measuring devices with necessary diagrams.	8	K2	CO3
		ii.	How the solar thermal energy is stored? Explain with any one example.	5	K2	CO3
			(OR)			
	b)	i.	Explain the construction and working of a solar PV cell with neat diagram.	7	K2	CO3
		ii.	Explain with a single line diagram of solar powered-Grid connected domestic electric distribution with net metering.	6	K2	CO3
14.	a)	i.	Explain the working of line commutated converter with neat circuit diagram.	6	K2	CO4
		ii.	Examine the performance parameters of any two converters used in solar PV system.	7	K4	CO4
			(OR)			
	b)	i.	Identify the role of PWM inverter in wind energy system and explain the working of the same.	7	K3	CO4
		ii.	Explain the working of three phase AC voltage controller with neat diagram.	6	K2	CO4
15.	a)	i.	Write the need of real and reactive power regulation and how the regulation is achieved in grid connected system.	6	K2	CO5
		ii.	Explain how the solar and wind energy system can withstand during the disturbance in the power grid.	7	K3	CO5
			(OR)			
	b)		Identify the power quality issues associated with the grid connected system and explain the working of power electronic converters addressing any two issues.	13	K2	CO5

PART – C

(1 x 15 = 15Marks)

Q.No.		Questions	Marks	KL	CO
16. a)	i.	Model the equivalent circuit of a solar cell and justify the reason for the components involved in the model with necessary equations.	8	K3	CO3
	ii.	Design a standalone solar PV system for operating two ceiling fans and 4 LED lamps. Assume the required parameters to describe the design steps.	7	K6	CO3
		(OR)			
b)	i.	Infer the parameters involved in selecting a site for the wind energy system.	8	K4	CO2
	ii.	Explain the isolated operation of a wind energy system.	7	K2	CO2

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[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]

Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 5034

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023

Seventh Semester

Electrical and Electronics Engineering

U19CSOE7 – OPEN SOURCE SOFTWARE

(Common to Information Technology)

(Regulation 2019)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	How many types of license does FOSS provide?	2	K1	CO1
2.	Differentiate between Free Software and Open Source Software.	2	K2	CO1
3.	What information is presented when the following commands are entered? i. date ii. who iii. passwd iv. bc	2	K1	CO2
4.	Write syntax for changing ownership and group name on a given file/s in Linux.	2	K2	CO2
5.	What is meant by operator associativity in PHP? Provide an example.	2	K2	CO3
6.	How to sort a MySQL Query Result?	2	K3	CO3
7.	How can you represent the number 64 in hexadecimal, in octal in Perl?	2	K3	CO4
8.	What does parameter passing by reference mean in Perl?	2	K3	CO4
9.	Discuss the limitations of CGI	2	K2	CO5
10.	In Perl we can show the warnings using some options in order to reduce or avoid the errors. What are that options?	2	K3	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	What is a software license? What are the different types of FOSS license?	8	K2	CO1
		ii.	What are the different principles and methodologies of open source software? Explain them in detail.	5		
			(OR)			
	b)		What is User mode and Kernel mode of Linux operating system? Explain the difference between them using suitable examples.	13	K3	CO1
12.	a)		Explain in detail about Signals used in Linux.	13	K2	CO2
			(OR)			
	b)	i.	Explain the discrete set of process states with example.	7	K1	CO2
		ii.	Explain in detail about scheduling in Linux.	6		
13.	a)	i.	Describe in detail about Meta Data in SQL.	8	K6	CO3
		ii.	List and explain Date and Time functions used in SQL.	5		
			(OR)			
	b)		Discuss in detail about File handling and Data storage in PHP.	13	K4	CO3
14.	a)		Explain with examples, the built in functions for String, Array and List in Perl.	13	K4	CO4
			(OR)			
	b)		Write a Perl script to			
		i.	Count the number of words in a file.	7	K6	CO4
		ii.	Show line numbers in a file	6		
15.	a)		Explain with an example how PERL can be used on the web, by using CGI programs.	13	K3	CO5
			(OR)			
	b)		Explain the following terms, with examples.			
		i.	Hashes	5	K6	CO5
		ii.	Context sensitivity	4		
		iii.	Verbs	4		

PART – C

(1 x 15 = 15 Marks)

Q.No.			Questions	Marks	KL	CO
16.	a)	i.	Define PHP Explain how Security and Templates can be implemented using PHP	8	K6	CO4
		ii.	What do you mean by exception handling? How is it different from debugging? Explain in detail about Debugging and error handling.	7		
			(OR)			
	b)	i.	Discuss about disk cloning in Linux.	8	K4	CO3
		ii.	Elaborate on various Linux Shells.	7		

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VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 6022

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023
Seventh Semester
Electrical and Electronics Engineering
U19ITOE9 – INTRODUCTION TO JAVA PROGRAMMING
(Regulation 2019)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	How dynamic initialization variables are achieved in java?	2	K2	CO1
2.	Differentiate between a Class and an Object?	2	K2	CO1
3.	What is the difference between abstract class and interface?	2	K2	CO1
4.	What is finalize () method?	2	K2	CO1
5.	Fill in the blank using Java Streams.	2	K2	CO3

```
import java.util.ArrayList;
import java.util.List;
 public class Test{
   public static void main(String[] args) {
List<String> names = new ArrayList<String>();
names.add("Jai");
names.add("Mahesh");
names.add("Ajay");
names.add("Hemant");
names.add("Vishal");
    ----------(Fill this part)
System.out.println(count+" strings with length less than 5");}}
```

6.	Differences between "extending" and "implementing" Threads.	2	K2	CO3
7.	Mention any four java string methods with description.	2	K2	CO4
8.	What is the purpose of a string tokenizer?	2	K2	CO4
9.	What are the features of JavaFX?	2	K2	CO5
10.	How to create a checkbox and scroll bar?	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Write a Java program to display all local maximum and local minimum elements in the given array A. An element x is said to be a local maximum if x is greater than that of its two consecutive left and right elements. An element x is said to be a local minimum if x is lesser than that of its two consecutive left and right elements. For example, If the number of elements are 10 and the array elements are 12, 15, 16, 7, 8, 21,17, 9, 90, 100 then the local maximum elements are 16, 21 and the local minimum elements are 7, 9.	13	K3	CO1
		(OR)			
	b)	Develop a Java program to process the marks of 'n' students using class, object and methods: For each student, read Digital Assignment 1, Digital Assignment 2 and Digital Assignment 3 marks and call the function by passing the above 3 marks. The maximum mark for each assignment is 10 and the weightage for each assignment is also 10. Compute the total weightage of Digital assignment in the function definition and return the value to the respective function call. Read CAT1 and CAT2 marks and call the function by passing these 2 marks separately. The maximum mark for each CAT is 50 and the weightage for each CAT is 15. Calculate the total weightage of CAT in the function definition and return the value to the respective function call. Read the FAT mark and call the function by passing this mark. The maximum mark for the FAT is 100 and apply the 40% weight for the given FAT marks and return the value to the respective function call. Call the function by passing all the above computed values (Total weight of digital assignment, total weight of CAT and the weight of FAT) to find the total weightage of each weightage. Return this total weightage of each student to the respective function call and display the results. Note: You must define 4 user defined functions to carry out the above task.	13	K3	CO1
12.	a)	Write a Java program to create a class namely 'Father' and interface namely 'Mother'. Read father's name, monthly salary, monthly expenses and monthly savings from the class 'Father' using a 'readFatherData' method. Fix mother's name as XYZ, monthly salary as 1 lakh, mother's monthly expenses as 10000, monthly savings as 50000 in the interface 'Mother'. Also declare a method namely 'displayMotherData' in the interface	13	K3	CO2

"Mother". Derive a class 'Child' which inherits the class 'Father' and implements the interface 'Mother'. In child class define a method "findSavingsAndExpenditure" to calculate the total savings and expenditure per year for both father and mother together. If their yearly savings is more than 30% of total income of both father and mother your program has to print "Good" else "Bad".

(OR)

	b)	Create an user defined Java package namely pack1,for the below problem: A Manager in an organization wishes to analyze the performance of his team members. Assume that he is supervising 5 employees in his division. Performance appraisal will be evaluated based on the score obtained by each employee. Develop a java program using to obtain the employee scores which are ranging from 1 to 5 and perform the following: 1) Display the lowest, highest and average scores of the employees. (3 marks) 2) Calculate the scores above average and below average scores separately and compute the number of employees in each array. (4 marks) 3) In your program, use suitable method to remove the non-object resources, once when the scope of the object completes the task. (3 marks) Note:Do not use in-builtsort() function.	13	K3	CO2
13.	a)	Explain the serialization concepts in java with suitable example.	13	K2	CO3
		(OR)			
	b)	Explain the runnable interface and runnable class in java with suitable example.	13	K2	CO3
14.	a)	Write a program that reads in a sentence and displays the count of distinct words and number of distinct characters.	13	K3	CO4
		(OR)			
	b)	Write a Java program to read contents from a file into byte array and also display the odd number sentences from the file.	13	K3	CO4
15.	a)	Write the JavaFX program for creating a library management system.	13	K3	CO5
		(OR)			
	b)	Write the JavaFX program for creating a railway ticket booking system.	13	K3	CO5

PART – C

(1 x 15 = 15 Marks)

Q. No.		Questions	Marks	KL	CO

16.	a)	Design the password interface with 2 methods namely userpw and cipherpw
		Interface password
		{
		void userpw();
		void cipherpw();
		}
		Bank Customer class implements password interface. The userpw() method gets the password of size 8. The allowed password string only Upper Case Alphabets.
		The cipherpw() method implments the following cipher algorithm
		Each letter in the original message is shifted by 3(shift amount) places. As a result, A becomes D, B becomes E, C becomes F, D becomes G, etc.
		The last three letters in the alphabet are wrapped around to the beginning: X becomes A, Y becomes B and Z becomes C. Write a Java program that allow the user to supply shift amount, and then display the shifted message.
			15	K4	CO2

		(OR)			
	b)	Pig Latin is a language constructed by transforming English words. While the origins of the language are unknown, it is mentioned in at least two documents from the nineteenth century, suggesting that it has existed for more than 100 years. The following rules are used to translate English into Pig Latin: 1. If the word begins with a consonant (including y), then all letters at the beginning of the word, up to the first vowel (excluding y), are removed and then added to the end of the word, followed by ay. For example, computer becomes omputercay and think becomes inkthay. 2. If the word begins with a vowel (not including y), then way is added to the end of the word. For example, algorithm becomes algorithmway and office becomes officeway. Write a program that reads a line of text from the user. Then your program should translate the line into Pig Latin and display the result. You may assume that the string entered by the user only contains lowercase letters and spaces	15	K4	CO2

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Question Paper Code: 8014

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023
Fifth Semester
Electrical and Electronics Engineering
U19EE517 – POWER SYSTEM PROTECTION AND SWITCH GEAR
(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	List the types of faults.	2	K1	CO1
2.	Define the terms primary and backup protection.	2	K2	CO1
3.	What is the principle of operation of a distance relay?	2	K1	CO2
4.	List any two difficulties of differential protection scheme.	2	K1	CO2
5.	List any two limitations of buchholz relay.	2	K1	CO3
6.	What are the different protection methods used for transmission line?	2	K1	CO3
7.	Define the terms of restriking voltage and recovery voltage.	2	K1	CO4
8.	Infer the term current chopping.	2	K2	CO4
9.	List any two advantages of using oil as an arc quenching medium.	2	K1	CO5
10.	Define symmetrical breaking capacity.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	What are the essential qualities of protective relay?	6	K2	CO1
		ii.	Analyze them in detail.	7	K4	
			(OR)			
	b)		Explain in detail about the need and different methods of neutral grounding with necessary diagrams.	13	K2	CO1

12.	a)	Explain the various types of electromagnetic relays with neat diagrams.	13	K2	CO2
		(OR)			
	b)	Describe the construction and principle of operation of a non-directional induction type over current relay.	13	K2	CO2
13.	a)	i. An 11 kV, 100 MVA alternator is grounded through a resistance of 5 Ohms. The CTs have a ratio as 1000/5. The relay is set to operate when there is an out of balance current of 1 A. What percentage of the generator winding will be protected by the percentage differential scheme of protection?	6	K4	CO3
		ii. An 11 kV, 100 MVA alternator is provided with differential protection. The percentage of winding to be protected against phase to ground fault is 85%. The relay is set to operate when there is 20% out of balance current. Determine the value of the resistance to be placed in the neutral to ground connection.	7	K4	CO3
		(OR)			
	b)	Explain the faults occurred in transformer and protection of transformers with neat diagrams.	13	K2	CO3
14.	a)	Explain current chopping and interruption of capacitive current.	13	K2	CO4
		(OR)			
	b)	i. Explain the various arc interruption methods.	6	K2	CO4
		ii. Describe the operating principle of a DC circuit breaker.	7	K2	CO4
15.	a)	Explain the construction and working principle of air blast circuit breaker and vacuum circuit breaker with neat diagrams.	13	K2	CO5
		(OR)			
	b)	For a 132 kV system, the reactance and capacitance up to the location of the circuit breaker is 3 Ohms and 0.015 μF, respectively. Calculate the following: i. The frequency of transient oscillation. ii. The maximum value of restriking voltage across the contacts of the circuit breaker.	13	K4	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16. a)	i.	A three-phase, 11 kV/132 kV, D-Y connected power transformer is protected by differential protection. The CTs on the LV side have a current ratio of 500/5. What must be the current ratio of the CTs on the HV side and explain how they should be connected with a neat diagram.	10	K4	CO3
	ii.	A 33 kV, 3 phase 50 Hz, overhead line 60 km long has a capacitance to ground of each line equal to 0.015 μF per km. Determine the inductance and kVA rating of the peterson coil.	5	K3	CO1
		(OR)			
b)		In a 220 kV system, the reactance and capacitance up to the location of circuit breaker is 8 Ohms and 0.025 μF, respectively. A resistance of 600 Ohms is connected across the contacts of the circuit breaker. Determine the following:			
	i.	Natural frequency of oscillation	5	K3	CO5
	ii.	Damped frequency of oscillation	5		
	iii.	Critical value of resistance which will give no transient oscillation.	5		

Reg.No.:								

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 8020

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023
Fifth Semester
Electrical and Electronics Engineering
U19EEE02 – BIO MEDICAL INSTRUMENTATION
(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	What is the fundamental difference between a resting potential and active potential?	2	K1	CO1
2.	Write two applications of Piezoelectric transducers in biomedical applications.	2	K2	CO3
3.	What are the sounds of Korotkoff and what causes them?	2	K1	CO2
4.	What is the pH range of human blood? Name two factors which regulate pH of human blood.	2	K2	CO1
5.	What are the segments seen in an ECG waveform?	2	K3	CO3
6.	Which is the most common reason of electrical shock in biomedical instruments?	2	K2	CO3
7.	What are the main applications of MRI?	2	K2	CO1
8.	Sketch the block diagram of a bio-telemetry system.	2	K3	CO4
9.	What are the two most common types of pacemakers implanted?	2	K1	CO4
10.	Name two disadvantages of a defibrillator.	2	K2	CO1

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Define a transducer and selection criteria for biomedical applications. What are the potential applications of ultrasonic and temperature transducers in bio-medical engineering?	13	K3	CO1

(OR)

	b)	Explain the functioning of the central nervous system. Where is it located? Why are nerves so important to our body?		13	K3	CO2
12.	a)	i. What is Photo Plethysmography and what are its potential applications?		6	K3	CO3
		ii. Explain the working of a fingertip oximeter.		7		
		(OR)				
	b)	Explain the automatic and semiautomatic methods of measuring blood pressure in detail.		13	K2	CO2
13.	a)	Explain in detail the EEG lead system. Name at least six conditions diagnosed by EEG.		13	K2	CO2
		(OR)				
	b)	i. What is a Differential amplifier and how is it used in Biomedical applications?		7	K1	CO3
		ii. Explain the working of an instrumentation amplifier.		6		
14.	a)	Discuss the working principle of endoscopy with the aid of a block diagram. What are the potential applications of endoscopy?		13	K3	CO1
		(OR)				
	b)	What is multi-channel bio-telemetry system? Explain its working with the help of a block diagram.		13	K1	CO5
15.	a)	i. Explain briefly ICCU Patient Monitoring System.		7	K1	CO2
		ii. Explain briefly the working of an AC defibrillator.		6		
		(OR)				
	b)	What is heart-lung machine? Discuss with the help of a block diagram.		13	K1	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.			Questions	Marks	KL	CO
16.	a)	i.	Explain the structure of human cell and its constituents with the help of neat sketch.	8	K3	CO3
		ii.	Explain the characteristics of resting potential with reference to Nernst equation.	7		
			(OR)			
	b)	i.	Explain Einthoven triangle and describe how ECG lead configurations are employed.	8	K3	CO1
		ii.	Explain the construction and working of skin surface electrode.	7		

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[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 8019

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023
Fifth Semester
Electrical and Electronics Engineering
U19EE516 – MICROPROCESSORS AND MICROCONTROLLERS
(Regulation 2019)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Write the pin details of 8085 processor.	2	K1	CO1
2.	List the types of interrupts in 8085.	2	K1	CO1
3.	Define the function of RAR instruction.	2	K2	CO2
4.	Mention the flags in 8085 microprocessor.	2	K1	CO2
5.	Write a program to mask the 0th and 7th bit using 8051.	2	K3	CO3
6.	Mention the special function registers in 8051.	2	K1	CO3
7.	In which mode do all the Ports of the 8255 PPI work as Input-Output units for data transfer?	2	K2	CO4
8.	Mention the number of counters and their input / output of 8254 programmable interval timer.	2	K2	CO4
9.	How PWM signals are generated?	2	K2	CO5
10.	Mention the formula to calculate step angle of stepper motor.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Explain about memory organization and I/O ports of 8085 processor.	13	K1	CO1

(OR)

	b)	Explain the timing diagram of any one of the data transfer instructions.	13	K4	CO1
12.	a)	Write an assembly language program in 8085 microprocessor to find maximum and minimum of 10 numbers.	13	K4	CO2
		(OR)			
	b)	i. Explain the function of any six arithmetic instruction in 8085 processor with example.	6	K2	CO2
		ii. Explain with example stack and machine control group of instruction set in 8085 processor.	7		
13.	a)	Explain about functional block diagram and pin configuration of 8051 microcontroller.	13	K1	CO3
		(OR)			
	b)	i. Mention the I/O instructions in 8051 microcontroller and its functions.	7	K2	CO3
		ii. Compare control instruction of 8085 and 8051.	6		
14.	a)	Draw the architecture of programmable DMA controller and explain.	13	K2	CO4
		(OR)			
	b)	Explain the function of keyboard and display controller with block diagram.	13	K2	CO4
15.	a)	Discuss with block diagram how servo motor is controlled using microcontroller?	13	K3	CO5
		(OR)			
	b)	Write a program to implement traffic light control using micro controller.	13	K3	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Discuss how washing machine control is implemented using microcontroller and write a program to implement rinse, wash and dry for washing machine using micro controller.	15	K3	CO5
		(OR)			
	b)	Write a program to generate PWM signal using micro controller (Assume a duty cycle of 2 msec) and control a motor using the generated PWM signal.	15	K3	CO4

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[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 8026

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023
Fifth Semester
Electrical and Electronics Engineering
U19EE518 – POWER SYSTEM ANALYSIS
(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 – Evaluating
	K2 – Understanding	K4 – Analyzing	K6 – Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Give the representation of an off-nominal transformer in power system.	2	K1	CO1
2.	How are base quantities selected in per unit system?	2	K2	CO1
3.	What is the need of slack bus for load flow analysis?	2	K2	CO2
4.	Write the effect of acceleration factor in the load flow solution algorithm.	2	K2	CO2
5.	What is the significance of sub transient reactance and transient reactance in short circuit studies?	2	K2	CO3
6.	Write any two advantages of symmetrical components.	2	K1	CO3
7.	The Z-bus method is very suitable for fault studies on large systems rather than Y bus. Why?	2	K2	CO4
8.	Name the faults in which zero sequence currents are absent.	2	K2	CO4
9.	State the significance of critical clearing time.	2	K2	CO5
10.	Define rotor angle stability.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Calculate the per unit quantities of the given one-line diagram. T_2 is composed of three single phase units each rated at 30 MVA, 66/10 kV with 5% reactance. Take generator rating as base.	13	K3	CO1

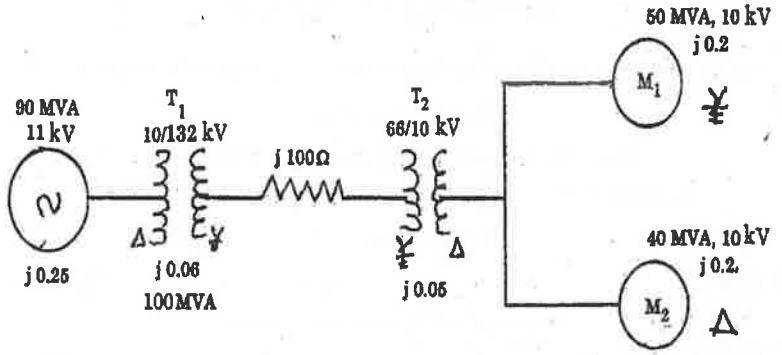

Figure 1

(OR)

	b)	Draw the impedance diagram of the power system shown in Figure 2. Mark impedances in per unit. Neglect resistance and use a base of 50 MVA, 138 kV in the 40 Ω line. The ratings of the generators, motor and transformers are: Generator 1: 20 MVA, 18 kV, X'' =20% Generator 2: 20 MVA, 18 kV, X" = 20% Synchronous Motor3: 30 MVA, 13.8 kV, X" = 20% Three Phase Y-Y transformers: 20 MVA, 138 Y/20Y kV, X = 10% Three Phase Y-Δ transformers: 15 MVA, 138 Y/13.8Δ kV, X = 10%.	13	K5	CO1

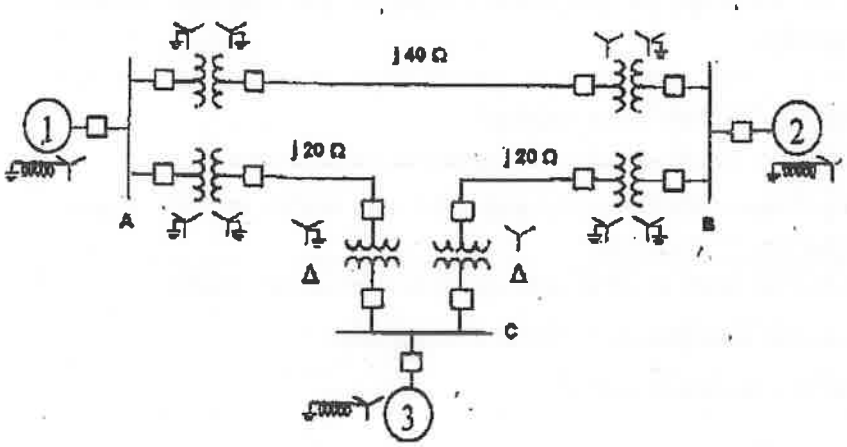

Figure 2

12. a) The one-line diagram of a simple three-bus power system with generation at bus 1 is shown in Figure 3. The line impedances are marked in per unit on a 100 MVA base. Find out the bus voltages after two iterations using Gauss-Seidel method. 13 K3 CO2

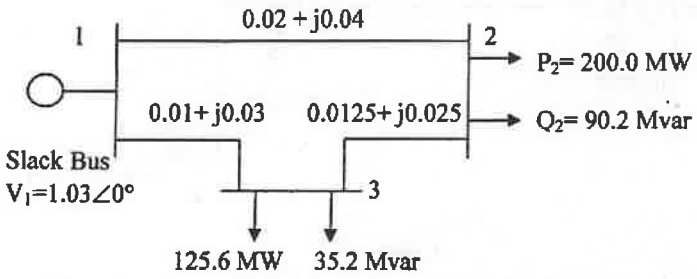

Figure 3

(OR)

b) With a neat flow chart, explain the computational procedure for load flow solution using Newton Raphson iterative method when the system contains all types of buses. 13 K2 CO2

13. a) i. Write a short note on fault current in synchronous machine. 6 K2 CO3

ii. A 3 phase, 5 MVA, 6.6 kV alternator with a reactance of 8% is connected to a feeder series impedance (0.12+j0.48) ohms/phase/km through a step-up transformer. The transformer is rated at 3 MVA, 6.6 kV/33 kV and has a reactance of 5%. Determine the fault current supplied by the generator operating under no load with a voltage of 6.9 kV, when a 3-phase symmetrical fault occurs at a point 15 km along the feeder. 7 K3 CO3

(OR)

b) A 25 MVA, 11 kV generator with Xd" =20% is connected through a transformer, line and a transformer to a bus that supplies three identical motors as shown in Figure 4 below. Each motor has Xd" =20% and Xd' =30% on a base of 5 MVA, 6.6 kV. The three-phase rating of the step-up transformer is 25 MVA, 11/66 kV with a leakage reactance of 10% and that of step down transformer is 25 MVA, 66/6.6 kV with a leakage reactance of 10%. The bus voltage at the motors is 6.6 kV when a three-phase fault occurs at thepoint F. For the specified fault, calculate

i. the sub transient current in the fault, 3

ii. the sub transient current in the breaker B, 3 K5 CO3

iii. the momentary current in the breaker B, and 3

iv. the current to be interrupted by breaker B in five cycles. 4

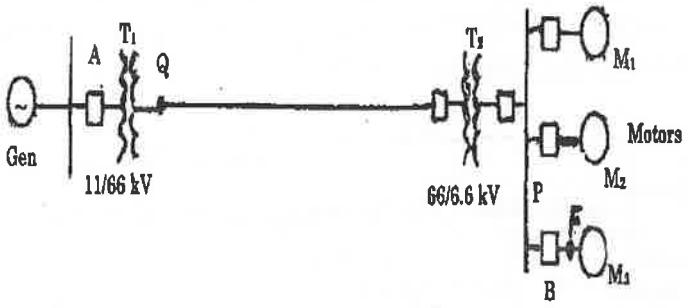

Figure 4

14. a) Derive the expression for fault current in double line to ground fault on unloaded generator. Draw the equivalent network showing the interconnection of networks to simulate double line to ground fault. 13 K2 CO4

(OR)

b) A single line to ground fault (phase a) occurs in a transmission system at transformer T1 star terminal. Draw the sequence network. Find the current fed to fault. Given: Rating of generator is 1200 kVA, 600 V with X' = X2 = 10%, Xo = 5%
Rating of each machine is 600 kVA, 600 V with X' = X2 = 12%, Xo = 6%
Each transformer is rated 1200 MVA, 600 V on delta side and 3.3 kV on star side, with leakage reactance of 5%.
Reactance of the transmission line is X1 = 10%, X2 = 10% and Xo =20%. 5+8 K3 CO4

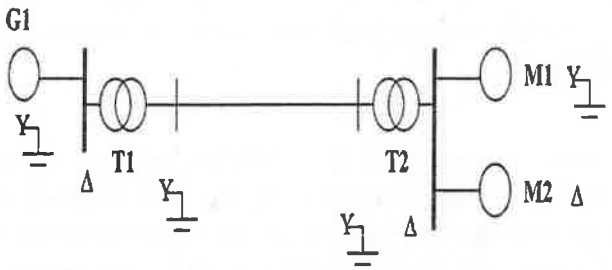

Figure 5

15. a) Discuss the concept of equal area criterion for transient stability analysis of a system. 13 K2 CO5

(OR)

b) Find the critical clearing angle and time for clearing the fault with simultaneous opening of the breakers when a three phase fault occurs at point P close to bus 1 as shown in Figure 6. The generator is delivering 1.0 pu power at the instant preceding the fault. 6+7 K5 CO5

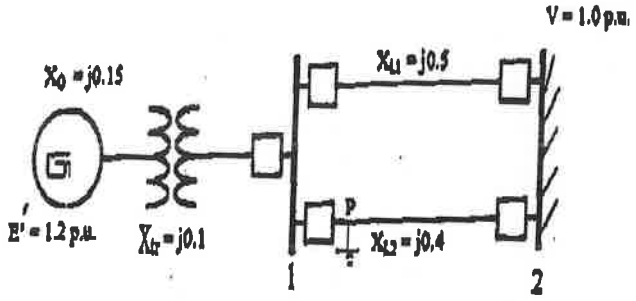

Figure 6

PART – C

(1 x 15 = 15 Marks)

Q.No.	Questions	Marks	KL	CO
16. a)	The parameters of a 4-bus system are us under:	6+9	K3	CO2

Line starting bus	Line ending bus	Line impedance	Line charging admittance
1	2	0.2+j0.8	j0.02
2	3	0.3+j0.9	j0.03
2	4	0.25+j1.0	j0.04
3	4	0.2+j0.8	j0.02
1	3	0.1+j0.4	j0.01

Draw the network and find bus admittance matrix.

(OR)

b) In the power system shown in Figure 7, three phase fault occurs at point P and the faulty line was opened a little late. Find the power output equations for the pre-fault, during fault and post fault calculation. The pu reactances offered are mentioned in the figure. 5+5+5 K5 CO3

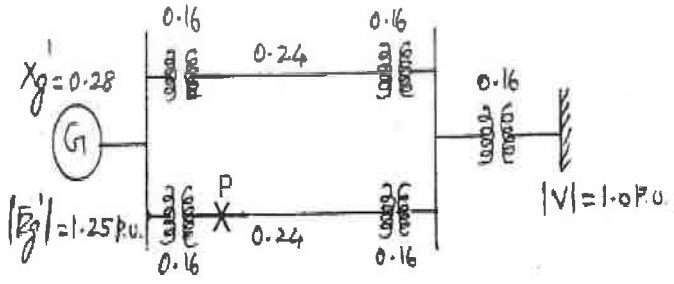

Figure 7

Reg.No.:								

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Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 8030

B.E. / B.Tech DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023
Fifth Semester
Electrical and Electronics Engineering
U19EE519 – POWER ELECTRONICS
(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Draw the circuit symbol of an SCR and its construction diagram with terminal names.	2	K1	CO1
2.	Draw the voltage-current characteristics of a PN junction diode. List two part numbers of power semiconductor diodes available in the market for 600 V.	2	K3	CO1
3.	What is the average value of the load voltage for a single-phase half-wave converter with an R-load?	2	K1	CO2
4.	What are the advantages of using a full-controlled bridge converter over a half-controlled bridge converter?	2	K2	CO2
5.	Give the expression for the output voltage of a buck-boost converter.	2	K1	CO3
6.	List the components used to construct a SEPIC converter. How does it differ from a buck-boost converter?	2	K2	CO3
7.	Draw the circuit diagram of a three-phase voltage source inverter and label its components.	2	K2	CO4
8.	Define harmonics.	2	K2	CO4
9.	Provide a brief explanation of the technology behind modern voltage regulators used to control the speed of a fan.	2	K4	CO5
10.	Draw the output voltage waveform of a single phase cycloconverter when it is given a voltage of $V_m \sin \omega t$.	2	K3	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	Explain the construction and operation of a MOSFET.	7	K2	CO1
		ii.	What are the losses of the MOSFET? Provide necessary equations for the losses.	6	K2	
			(OR)			
	b)	i.	Explain the construction and operation of an SCR.	7	K2	CO1
		ii.	How can an SCR be turned off from its on-state? Provide the circuit of a typical commutation circuit.	6	K3	
12.	a)		Explain the operation of a single-phase semi controlled rectifier with suitable analytical waveforms. Also, derive the expression of the output voltage.	13	K2	CO2
			(OR)			
	b)	i.	Explain the operation of a three phase full wave converter with RLE load and derive the expression of the output voltage.	8	K2	CO2
		ii.	Briefly explain the operation of a dual converter.	5	K2	
13.	a)	i.	Explain the operation of a Fly back converter	7	K2	CO3
		ii.	Draw the circuit diagram of the Cuk converter and explain the output.	6	K2	
			(OR)			
	b)		Design a boost converter to provide a 48 V output from a 24 V input source. Consider an output power of 100 W and an operating frequency of 10 kHz. Provide the expression of the current and voltage of each component of the boost converter.	13	K5	CO3
14.	a)		Explain the operation of a three phase inverter in 180° mode with necessary analytical waveforms. Derive the expression for the output voltage.	13	K4	CO4
			(OR)			
	b)		Explain the construction and operation an online UPS. Draw the necessary power converter circuit to interface a 48 V, 1 kW solar PV with a 230 V, 50 Hz UPS.	13	K5	CO4
15.	a)		Explain the operation of a two-stage sequence regulator with RL load using necessary analytical waveforms. List the applications of a voltage regulator.	13	K2	CO5
			(OR)			
	b)		Explain the construction and operation of a three-phase matrix converter with necessary analytical waveforms. List the applications of a matrix converter.	13	K3	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	A 230 V, 1500 rpm, 5 HP DC motor is powered from a 230 V single-phase AC supply through a suitable power converter. Draw the block diagram of the above system with a suitable power converter. Explain the operation of the converter with suitable analytical waveforms. Also, derive the expression for the output voltage.	15	K4	CO3
		(OR)			
	b)	A floor mill has a 10 HP, 3-phase, 50 Hz, 400 V induction motor, and it is powered by a 3-phase, 400 V, 50 Hz utility grid. Design a suitable power converter system to integrate a 10 kW, 48 V solar PV system to power the motor and to feed any excess power present in the solar PV system after meeting the demand of the motor.	15	K4	CO4

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[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 9022

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023
Fifth Semester
Electrical and Electronics Engineering
U19BTOE1 – BIOLOGY FOR ENGINEERS
(Common to Biomedical Engineering)
(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Brief on the fluid mosaic model.	2	K1	CO1
2.	Differentiate a prokaryotic and eukaryotic cell.	2	K2	CO1
3.	Draw and label the parts of a nerve cell.	2	K1	CO2
4.	Compare active and passive diffusion.	2	K2	CO2
5.	What is a antigen?	2	K1	CO3
6.	What are the types of blood cells?	2	K2	CO3
7.	Classify the generations of biofuels with examples.	2	K1	CO4
8.	Name some of the algae used in the formulation of biofertilizers.	2	K1	CO4
9.	What is the role of DNA in genetics and heredity	2	K4	CO5
10.	Brief on the applications of ANN in the field of biology.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)		Describe the structure and functions of various cell organelles of a eukaryotic cell.	13	K1	CO1
			(OR)			
	b)	i.	Differentiate a plant and animal cell.	4	K5	CO1
		ii.	Explain the working of a light microscope with suitable diagram.	9	K1	CO1
12.	a)		Illustrate the various stages of cell cycle.	13	K1	CO2
			(OR)			
	b)		With a neat diagram, elaborate the working of excretory system. Brief on the disease associated with the same.	13	K1	CO2
13.	a)		Describe the activation of T-cells.	13	K2	CO3
			(OR)			
	b)	i.	Distinguish between innate and acquired immune system.	4	K3	CO3
		ii.	Sketch and describe the general structure of a antibody.	9	K2	
14.	a)		Write notes on any 2 methods of synthesis of nanoparticles.	13	K6	CO4
			(OR)			
	b)		With a neat diagram describe the working of a biosensor and its various components.	13	K4	CO4
15.	a)	i.	Explain the contributions made by Mendel in the field of genetics.	8	K2	CO5
		ii.	Elaborate the important steps in the creation of a GMO.	5	K1	CO5
			(OR)			
	b)		What are stem cells? Illustrate its application in restorative medicine.	13	K6	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.			Questions	Marks	KL	CO
16.	a)	i.	Discuss the industrial applications of microbiology in our day today life.	8	K2	CO3
		ii.	Write short notes on the disease causing microbes with suitable examples.	7	K1	CO3
			(OR)			
	b)		How are biosensors used in the monitoring of the blood glucose level? Illustrate with a neat diagram.	15	K3	CO4

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[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 2005

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023
Third Semester
Electrical and Electronics Engineering
U19MA303 – TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS
(Common to Electronics and Communication Engineering, Biomedical Engineering and Biotechnology)
(Regulation 2019)

Time : Three Hours | Maximum : 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Find the first term of the Fourier series for the function $f(x) = x^2, -2 < x < 2$.	2	K1	CO2
2.	Find the sum of the Fourier series of $f(x) = \begin{cases} k, & -1 < x < 0 \\ x, & 0 < x < 1 \end{cases}$ at $x = 0$.	2	K1	CO2
3.	Form the partial differential equation by eliminating the arbitrary constants a and b from $ax^2 + by^2 + z = 1$.	2	K2	CO1
4.	Find the general solution of $(D^2 - 3DD' + 2D'^2)z = 0$.	2	K1	CO1
5.	Write all the possible solution of the one-dimensional wave equation.	2	K1	CO3
6.	Classify the partial differential equation $y^2u_{xx} - 2xyu_{xy} + x^2u_{yy} + 2u_x - 3u_y = 0$.	2	K1	CO3
7.	Find the Fourier sine transform of $\frac{1}{x}$.	2	K1	CO4
8.	Write down the Fourier cosine transform pair formulae.	2	K1	CO4
9.	Find the Z- transform of $\frac{a^n}{n!}, n \geq 0$.	2	K1	CO5
10.	If $F(z) = \frac{z^2}{(z-2)(z-3)}$, find $f(0)$.	2	K2	CO5

PART – B

(5 x 16 = 80 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i	Find the Fourier series expansion of periodic function $f(x) = \begin{cases} -\pi, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$ Deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots + \infty = \frac{\pi^2}{8}$.	10	K1	CO2
		ii	Find the Fourier series of $f(x) = x^2$ in $(-\pi, \pi)$.	6	K1	CO2
			(OR)			
	b)	i	Find up to second harmonics of the Fourier series of $f(x)$ given by the following data.	8	K1	CO2

x	0	$T/6$	$T/3$	$T/2$	$2T/3$	$5T/6$
$f(x)$	1.98	1.30	1.05	1.30	−0.88	−0.25

		ii	Find the half range cosine series of $f(x) = x$ in $(0, \pi)$ and hence prove that $\frac{1}{1^4} + \frac{1}{3^4} + \frac{1}{5^4} + \cdots + \infty = \frac{\pi^4}{96}$.	8	K1	CO2
12.	a)	i	Construct the general solution of $(y - xz)p + (yz - x)q = (x^2 - y^2)$.	8	K3	CO1
		ii	Solve $(D^2 - 4DD' + 4D'^2)z = x^2y + e^{x-y}$	8	K3	CO1
			(OR)			
	b)	i	Solve $z = px + qy + p^2q^2$	8	K3	CO1
		ii	Solve $(D^2 - 5DD' + 6D'^2)z = \sin(x - 2y) + e^{2x}$	8	K3	CO1
13.	a)		If a string of length $2l$ is initially at rest in its equilibrium position and each of its points is given the velocity $\left(\frac{\partial y}{\partial t}\right)_{t=0} = k(2lx - x^2),\ 0 < x < 2l.$ Determine the displacement function $y(x,\ t)$.	16	K5	CO3
			(OR)			
	b)		A rod of length 30 cm has its ends A and B kept at 30°C and 90°C respectively, until steady state conditions prevail. The temperature at each end is suddenly reduced to 0°C and kept so. Find the resulting temperature distribution function $u(x, t)$ taking $x = 0$ at A.	16	K5	CO3
14.	a)		Find the Fourier transform of $f(x) = \begin{cases} 1 - x^2, & \lvert x \rvert < 1 \\ 0, & \lvert x \rvert > 1 \end{cases}$. Hence evaluate $\int_0^\infty \left(\frac{\sin x - x\cos x}{x^3}\right) \cos\frac{x}{2}\, dx$.	16	K3	CO4
			(OR)			
	b)	i	Find the Fourier sine transform of $\frac{x}{1+x^2}$.	8	K3	CO4
		ii	Make use of transform method to evaluate $\int_0^\infty \frac{dx}{(x^2+4)(x^2+9)}$.	8	K3	CO4

15.	a)	i	Find the Z-transform of $\frac{1}{n(n+1)(n+2)}$.	8	K1	CO5
		ii	Make use of convolution theorem so evaluate the inverse Z- transform of $\frac{z^2}{\left(z-\frac{1}{2}\right)\left(z-\frac{1}{4}\right)}$.	8	K3	CO5
			(OR)			
	b)	i	Find the inverse Z- transform of $\frac{z^3-20z}{(z-2)^3(z+4)}$. Using partial fraction method.	8	K1	CO5
		ii	Solve $y(n+2)+2y(n+1)+y(n)=n$ given $y_0=y_1=0$.	8	K3	CO5

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VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 8022

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS –JUNE 2023
Third Semester
Electrical and Electronics Engineering
U19EE304 – DIGITAL LOGIC CIRCUITS
(Regulation 2019)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Prove that ABC + ABC' + AB'C + A'BC = AB + AC + BC.	2	K2	CO1
2.	Find the 2's complement and 1's complement of 101101.	2	K2	CO1
3.	Why MUX is called as data selector?	2	K1	CO2
4.	How to avoid lock out condition?	2	K2	CO2
5.	What is the operation of T flip-flop?	2	K1	CO3
6.	Compare combinational and sequential circuits.	2	K1	CO3
7.	What is the significance of state assignment?	2	K1	CO4
8.	What are the steps for the design of asynchronous sequential circuit?	2	K1	CO4
9.	What is programmable logic array? How it differs from ROM?	2	K2	CO5
10.	What is Diode Transistor Logic?	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Minimize the Boolean function F(A, B, C, D) = Σm(0, 2, 4, 6, 8, 10, 12, 14) using K map. Realize it using NAND gates.	9+4	K2	CO1

(OR)

	b)	Minimize the Boolean function F(A, B, C, D) = Σm(0, 1, 2, 3, 6, 7, 13, 15) using K map. Implement the same using basic gates.		9+4	K2	CO1
12.	a)	Design a 8421 to gray code converter.		13	K1	CO2
		(OR)				
	b)	Draw the logic diagram of full subtractor and explain its operation.		13	K1	CO2
13.	a)	i.	Realize a JK flip flop using SR flip flop.	6	K1	CO3
		ii.	Realize a SR flip flop using NAND gates and explain its operation.	7		
		(OR)				
	b)	Design a 4-bit synchronous 8421 decade counter with ripple carry.		13	K1	CO3
14.	a)	i.	Explain the fundamental mode asynchronous sequential circuit.	6	K1	CO4
		ii.	Briefly explain the pulse mode asynchronous sequential circuit.	7		
		(OR)				
	b)	Explain with an example the method for the minimization of primitive flow table.		13	K1	CO4
15.	a)	i.	Explain the operation of bipolar RAM cell with suitable diagram.	6	K1	CO5
		ii.	Explain the different types of ROM.	7		
		(OR)				
	b)	i.	Draw the circuit of TTL NAND gate and explain its operation.	6	K1	CO5
		ii.	Draw the circuit of NMOS NAND gate and explain its operation.	7		

PART – C

(1 x 15 = 15 Marks)

Q.No.			Questions	Marks	KL	CO
16.	a)	i.	Solve the four – variable K – map for P = (R, S, T, U) = Σ (1, 3, 4, 5, 6, 9, 11, 12, 14) and comment on your final result.	8	K4	CO1
		ii.	Using 8 to 1 multiplexer, realize the Boolean function T = f (w, x, y, z) = Σ(0, 1, 2, 4, 5, 7, 8, 9, 12, 13)	7	K4	CO2
			(OR)			
	b)	i.	Convert the following : 1. 11101101111_2 to Decimal 2. 575_{10} to Octal 3. $16FA_{16}$ to Binary 4. 545_8 to Decimal	8	K4	CO1
		ii.	Design a half using NAND – NAND logic.	7	K4	

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Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 8016

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023
Third Semester
Electrical and Electronics Engineering
U19EE303 – ANALOG ELECTRONICS
(Regulation 2019)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Recall the symbols for PN Diode, Zener Diode, LED and UJT.	2	K2	CO1
2.	Write the relation between I_C, β, I_B and I_{CBO} in a BJT.	2	K2	CO1
3.	List the various types of amplifiers based on transistor configuration and Q-point (operating condition).	2	K2	CO1
4.	Outline the Darlington transistor configuration and summarise its salient features.	2	K2	CO1
5.	Write the general characteristics of negative feedback amplifier.	2	K2	CO2
6.	An amplifier has an open loop gain of 1000 and a feedback ratio of 0.04. If the open loop gain changes by 10% due to temperature, find the percentage change in gain of the amplifier with feedback.	2	K4	CO2
7.	In a Wien bridge oscillator, if the value of capacitance C is 1000 pF and a frequency of oscillation is 500 kHz, find the value of R.	2	K2	CO4
8.	Outline equivalent circuit of a piezo crystal and name the metals showing the piezo electric effect.	2	K2	CO4
9.	Recall the role of bleeder resistance connected in the output of a filter circuit	2	K3	CO5
10.	Name the types of IC voltage regulator and give one example for each.	2	K3	CO5

PART – B

(5 x 13 = 65 Marks)

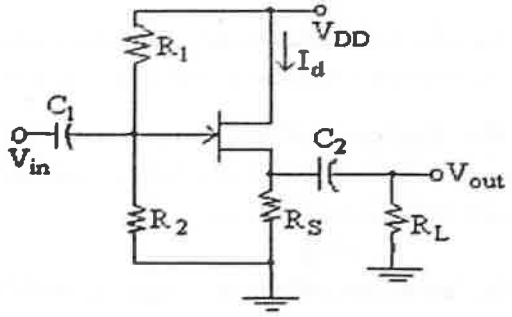
Q.No.			Questions	Marks	KL	CO
11.	a)	i.	Explain the operation of silicon PN junction diode with forward and reverse bias conditions.	5	K2	CO1
		ii.	Draw the circuit diagram of NPN transistor in common base (CB) configuration. Deduce necessary equations to describe its static input- output characteristics indicating the cut-off, saturation and active regions on the output characteristics.	8	K2	CO1
			(OR)			
	b)	i.	Justify statement "Potential divider bias is the most commonly used biasing method" for BJT circuits. Explain how bias compensation can be done in such biasing through diodes.	8	K2	CO1
		ii.	Draw the basic circuit and small-signal model of Common Drain FET amplifier.	5	K2	CO1
12.	a)		Derive the equations for voltage gain, current gain, input impedance and output admittance for BJT using low frequency h-parameter model for • CE configuration • CB configuration • CC configuration	13	K2	CO1
			(OR)			
	b)	i.	In a class-A amplifier $V_{CE\ max}$ = 25V, $V_{CE\ min}$ = 5V. Calculate the overall efficiency for series fed load and transformer coupled load.	5	K4	CO2
		ii.	Derive the expression for power output and conversion efficiency of a class-A series fed amplifier.	8	K4	CO2
13.	a)		Compare the following feedback topology characteristics for voltage series, current series, voltage shunt and current shunt feedback amplifiers & derive the mathematical expression for applicable characteristics 1) Input resistance, 2) Output resistance, 3) Voltage Gain, 4) Band width, 5) Non linear distortion and noise.	13	K4	CO3
			(OR)			

b)	i.	A voltage series negative feedback amplifier has a voltage gain without feedback of A = 500, input resistance = 3 KΩ, output resistance = 20 KΩ and feedback ratio factor = 0.01. Calculate the voltage gain, input resistance, and output resistance of the amplifier with feedback.	5	K4	CO3
	ii.	Explain types of feedback amplifier topologies based on output sampling and input side mixing.	8	K4	CO3
14. a)	i.	Classify the oscillators according to waveform generation, mechanism, frequency generation and type of circuit.	5	K2	CO4
	ii.	Outline the Hartley oscillator circuit and derive the expression for frequency of oscillation and arrive the condition for sustained oscillation.	8	K2	CO4
		(OR)			
b)	i.	Analyse the factors that affects the frequency stability of an oscillator.	5	K2	CO4
	ii.	Outline the crystal oscillator circuit and explain the construction of X-cut and Y-cut crystals with the expression for the frequency of vibration.	8	K2	CO4
15. a)		Describe a circuit and analyse the output wave forms for ripple factor expression using: i. Inductive (L) and ii. Capacitive (C) filter.	13	K3	CO5
		(OR)			
b)	i.	Describe the operation of a basic linear voltage regulator with a neat circuit diagram.	5	K3	CO5
	ii.	Explain the application of zenor diode with a circuit for a constant voltage requirement	8	K3	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.			Questions	Marks	KL	CO
16.	a)	i.	The FET circuit below has R_1 = 3.5MΩ, R_2 = 1.5MΩ, R_S = 2 KΩ, and R_L= 20 KΩ with g_m = 2.5 m.s. Determine the input impedance and voltage gain.	7	K2	CO1



		ii.	Design a collector to base bias circuit using silicon transistor to achieve a stability factor of 20, with the following specifications: V_{CC} = 16V, V_{BE} = 0.7V, V_{CEQ} = 8V, I_{CQ} = 4 mA & β= 50.	8	K2	CO1
			(OR)			
	b)	i.	Design the Zenor shunt regulator for the following specifications. • The DC input is 10 V± 20%. • The output requirements are 5 V, 20 mA. • Assume currents $I_{Z\ (min)}$ and $I_{Z\ (max)}$ as 5 mA and 80 mA.	7	K3	CO5
		ii.	Sketch V-I characteristics of a PN diode for the following conditions: 1) $R_f = 0, V\gamma = 0, Rr = \infty$ 2) $Rf = 0, V\gamma = 0.6V, Rr = \infty$ 3) Rf = Non-zero, fixed value, $V\gamma = 0, Rr = \infty$ 4) Rf = Non-zero, fixed value, $V\gamma = 0.6V, R r = \infty$ Where Vγ is the cut-in voltage, R_f is the forward dynamic resistance & Rr is the reverse dynamic resistance of the diode.	8	K2	CO1

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VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]

Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 8025

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023

Third Semester

Electrical and Electronics Engineering

U19EE305 – ELECTROMAGNETIC FIELDS

(Regulation 2019)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

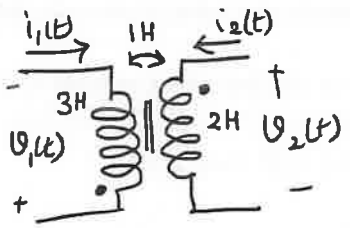
PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Define the concept of divergence of a field.	2	K1	CO1
2.	If A = $(2\hat{r} + 7\hat{\varphi} - 2\hat{z})$ and B = $(-10\hat{\varphi})$, find the direction of a vector which is parallel to (5A-3B) vector at a distance of 5m from it.	2	K3	CO1
3.	Brief the concept of electrostatic potential.	2	K1	CO2
4.	Find the capacitance of parallel plate capacitor having stored energy of 5μJ with voltage between plates is 4V.	2	K2	CO2
5.	Mention the use of Stoke's theorem in magnetic field theory.	2	K1	CO3
6.	Verify if $B = (27z + 27xy^2z)\hat{x} - (18x^2z + 9xy^3z)\hat{y} + (31y^2x - x^2z)\hat{z}$ satisfies Gauss's law for magnetic fields.	2	K3	CO3
7.	Differentiate Faraday's Law and Lenz's Law.	2	K2	CO4
8.	What is the significance of Lenz's law in the operation of a transformer?	2	K2	CO4
9.	Mention the concept of displacement current using an example of parallel plate capacitor.	2	K2	CO5
10.	Define Poynting's vector with an example.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)		Express the magnetic flux density B = $(10\hat{x} + 5\hat{y} - 2\hat{z})$ Wb/m^2 in cylindrical and spherical coordinate systems.	6.5+6.5 =13	K3	CO1
			(OR)			
	b)		Verify divergence theorem for D = $(3x^2y\,\hat{x} + 5y^2\,\hat{y})$ C/m^2 on a rectangular parallel piped formed by the planes x = 2, x = 4, y = 1, y = 2, z = 1 and z = 3.	13	K3	CO1
12	a)		Find the electric field intensity at a height h from a circular ring of radius r having a line charge density of magnitude ρ_l. Find the distance at which field is maximum.	13	K3	CO2
			(OR)			
	b)		Determine the work necessary to transfer charges Q1 = 4mC and Q2 = -7mC from infinity to points (-2, 6, 1) and (3, -4, 0) respectively. If a third charge of magnitude 10mC is to be moved, find the point at which the net work done is (2/3)rd of the work calculated in the previous step.	6.5+6.5 =13	K3	CO2
13	a)	i.	With necessary equations, prove that an isolated magnetic pole does not exist.	5	K4	CO3
		ii.	Find the divergence of magnetic field $H = (2r^2\sin\varphi\hat{r} - 5r^3\cos^2\theta\hat{\theta} + 2r\sin\theta\cos^2\varphi\hat{\varphi})$ A/m at the point $(0.5, \frac{\pi}{3}, \frac{2\pi}{3})$.	8		
			(OR)			
	b)	i.	An infinitely long filamentary wire carries current of 3A in $+y$ direction. Calculate the magnetic flux density at (-1, 4, -2).	5	K4	CO3
		ii.	Derive the magneto static boundary conditions at the interface between two different magnetic materials.	8		
14	a)	i.	Write the expression for $v_1(t)$ and $v_2(t)$ from Fig. 1.	5	K3	CO4
			 Fig.1			
		ii.	Derive the expression for self-inductance and mutual inductance of two tightly coupled coils. Also, obtain the relation between these inductances.	8		

(OR)

	b)	i.	Derive the expression for the potential difference between the points on the inner radius 'a' and outer radius 'b' of a coaxial cable of length 'l'.	8	K3	CO4
		ii.	Use the above result and obtain the expression for capacitance of the coaxial cable.	5		
15	a)	i.	Derive the Maxwell's equation (in integral form) based on Ampere's Law.	8	K2	CO5
		ii.	If the magnetic field intensity $H= 5e^{-\alpha x}\cos(10^8t- 3x)\hat{y}$ A/m in a nonmagnetic, perfect dielectric medium with $\varepsilon_r= 4$, obtain the value of average power carried by the EM wave.	5		

(OR)

	b)		For the magnetic field intensity intensity $H = H_o\cos(\omega t + \beta z)\hat{x}$ A/m			
		i.	Derive (with proper steps) the expression for electric field intensity E.	8	K4	CO5
		ii.	Analytically obtain the direction of the power propagation.	5		

PART – C

(1 x 15 = 15 Marks)

Q.No.			Questions	Marks	KL	CO
16.	a)		A transmission line system of 4 m length has the following parameters: $\omega=10^8$ rad/s, $\propto$ = 4 dB/m, β = 1 rad/m, $Z_o = 50 + 40j\Omega$, Load $Z_L = 60 + 50j\Omega$, source voltage $20\angle 0^o$ V, source impedance = 10 Ω. Determine the following-			
		i.	Input impedance,	7.5	K4	CO5
		ii.	Load current	7.5		

(OR)

	b)	i.	If $E = 10e^{-4z}\sin\left(\omega t + 10z + \frac{\pi}{6}\right)\hat{x}$ V/m and $H = -4e^{-4z}\cos(\omega t + 10z)\hat{y}$ A/m. At what value of z does the power transmitted reduce by 30% of its initial value?	7.5	K4	CO5
		ii.	An electromagnetic wave travelling in + x direction has its electric field along -y direction. The wave travels and reaches the boundary of two mediums. Write the expression for the total wave (both electric and magnetic fields) on either side of the boundary, if SWR=1.	7.5		

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VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 8031

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023
Third Semester
Electrical and Electronics Engineering
U19EE307 – DC MACHINES AND TRANSFORMERS
(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	For a singly-excited magnetic system, write the relationship between magnetic field energy and co-energy.	02	K1	CO1
2.	Write the expression for magnetic energy stored in terms of reluctance.	02	K2	CO1
3.	Mention the conditions to be satisfied for voltage buildup in DC Generator.	02	K2	CO2
4.	Write the working principle of DC generator.	02	K2	CO2
5.	Why starter is required for starting a DC motor?	02	K3	CO3
6.	Draw & brief about the speed-torque characteristic of DC series motor.	02	K3	CO3
7.	What are the different losses in a transformer?	02	K3	CO4
8.	List out the essential conditions to be fulfilled for operating two 3-phase transformers in parallel.	02	K2	CO4
9.	What is the need of open and short circuit test of transformer?	02	K2	CO5
10.	Define all day efficiency.	02	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Derive the expression for torque developed in doubly-excited magnetic system with the assumptions.	13	K2	CO1

(OR)

	b)	Derive the expression for the stored energy in a singly-excited electric field system.	13	K2	CO1
12.	a)	Define commutation. Explain the process of commutation in DC generators with neat sketches and describe the methods to improve it.	13	K3	CO2
		(OR)			
	b)	Explain armature reaction in DC generator and its effect on the operation of DC machines. How it can be minimized?	13	K3	CO2
13.	a)	What are the different methods of speed control for DC motor? Discuss merits and demerits of each method.	13	K3	CO3
		(OR)			
	b)	A 120 Volt DC shunt motor has an armature resistance of 0.2Ω and a field resistance of 60Ω. The full load line current is 60 A and full-load speed is 1800 rpm. If the brush contact drop is 3V, find the speed of the motor at half load.	13	K4	CO3
14.	a)	Define the voltage regulation of a transformer. Derive the expression for (a) zero regulation, (b) maximum regulation.	13	K2	CO4
		(OR)			
	b)	Develop the phasor diagram of a single-phase transformer under load condition for (a) lagging power factor load, (b) leading power factor load.	13	K2	CO4
15.	a)	Open circuit and short circuit tests on a 5kVA, 220/400 V, 50 Hz, single phase transformer gave the following result. O.C test: 220 V, 2 A, 100 W, S.C test: 40 V, 11.4 A, 200 W. Determine the efficiency and approximate regulation at full load 0.9 power factor lagging.	13	K4	CO5
		(OR)			
	b)	Describe the Hopkinson's test for obtaining the efficiency of shunt motor.	13	K3	CO5

PART – C

(1 x 15 = 15Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Derive an expression for saving in conductor material in an Auto-transformer over a two-winding transformer of equal rating. State the advantages and disadvantages of auto-transformers over two-winding transformers.	15	K3	CO4
		(OR)			
	b)	Describe Ward-Leonard method of speed control with neat circuit diagram. Also, explain its characteristics, advantages and disadvantages	15	K3	CO3

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[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 8029

B.E. / B.Tech DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023
Third Semester
Electrical and Electronics Engineering
U19EE306 – MEASUREMENTS AND INSTRUMENTATION
(Regulation 2019)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	What are the types of errors in measurement system?	2	K1	CO1
2.	What is calibration?	2	K1	CO1
3.	What is the difference between analog and digital instrument?	2	K2	CO2
4.	Distinguish moving coil instruments from moving iron instruments.	2	K4	CO2
5.	Why the sweep generator is used in oscilloscope?	2	K2	CO3
6.	What is isolation probe?	2	K2	CO3
7.	State the advantages of using the bridge circuits for measuring the electrical quantities.	2	K1	CO4
8.	What is electrostatic shielding?	2	K2	CO4
9.	Compare active transducers & passive transducers.	2	K4	CO5
10.	Write the merits of optical transducers.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Define limiting errors. Derive the expression for relative limiting errors.	13	K2	CO1
		(OR)			
	b)	Explain the calibration techniques and draw the general calibration curve.	13	K3	CO1

12.	a)	Derive the torque equation of electrodynamometer type instrument and explain its working principle.		13	K2	CO2
		(OR)				
	b)	i.	The inductance of a moving iron ammeter with full scale deflection of 90° at 1.5 A, is given by the expression $L= (200 + 40\theta - 4\theta^2 - \theta^3)$ μH, where θ is the deflection in radian from zero position. Estimate the angular deflection of the pointer for a current of 1.0 A.	5	K4	CO2
		ii.	Explain the working of a PMMC instrument and derive its torque equation.	8	K2	
13.	a)	Draw the circuit diagram of any three types of digital voltmeter and explain its working.		13	K2	CO3
		(OR)				
	b)	Draw and explain the circuit diagram of digital frequency meter & digital phase meter.		13	K2	CO3
14.	a)	i.	What are the different factors that affect the precision measurement of medium resistances with Wheatstone bridge? Explain how their effects are minimized/eliminated.	7	K4	CO4
		ii.	Explain the process of measuring temperature by optical pyrometer.	6	K2	
		(OR)				
	b)	Describe the working of any one inductance & capacitance bridge.		13	K2	CO4
15.	a)	Describe the different modes of operation of piezo electric transducers.		13	K3	CO5
		(OR)				
	b)	Discuss in detail about optical encoder, Resistive encoder and shaft encoder.		13	K3	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.			Questions	Marks	KL	CO
16.	a)	i.	Determine the smallest measurable change in the voltage of an analog voltmeter having range (0-200) V with resolution of 0.15% of full scale.	5	K3	CO2
		ii.	Explain the working of power quality analyzer.	10	K2	CO3
		(OR)				
	b)	i.	Sketch and describe pressure measurement system for 800mm pressure, that contain Bourdon tube and LVDT.	10	K3	CO5
		ii.	Identify the applications of LVDT, Strain Gauge thermistors.	5		

(b)

Reg.No.:								

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
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Question Paper Code: 2008

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023
First Semester
Electrical and Electronics Engineering
U15MA101 – CALCULUS
(Common to Biotechnology)
(Regulation 2015)

Time : Three Hours | Maximum : 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Find the continuity and differentiability of f (x) defind below at x = 2 if $f(x)=\begin{cases}1+x & for\ x\le 2\\ 5-x & for\ x>2\end{cases}$.	2	K1	CO1
2.	Evaluate $\lim_{x\to\frac{\pi}{4}}\left[\frac{\sin x-\cos x}{x-\frac{\pi}{4}}\right]$	2	K5	CO1
3.	Explain the geometrical meaning of $\frac{\partial z}{\partial x},\frac{\partial z}{\partial y}$	2	K2	CO2
4.	Write the difference between stationary and critical points.	2	K1	CO2
5.	Evaluate $\int \log x dx$	2	K5	CO3
6.	Find $\int_0^{\frac{\pi}{2}}\cos^6 x dx$	2	K1	CO3
7.	Why do use change of order of Integration? Justify your answer with an example.	2	K1	CO4
8.	Transform $\int_0^\infty\int_0^\infty y\,dx\,dy$ into polar coordinates.	2	K5	CO4
9.	Find the particular integral of $(D^3+1)y=\sin(4x+8)$.	2	K5	CO5

10.	Convert $\left(x^2D^2+xD+1\right)y=\log x$ into an ordinary differential equation with constant coefficients.		2	K6	CO5

PART – B

(5 x 16 = 80 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	Find the maximum and minimum value of $f(x)=2x^3-9x^2-24x-20$	8	K1	CO1
		ii.	Build $\log_e x$ in powers of (x-1) and hence evaluate $\log_e 1.1$ correct to 4 decimal places.	8	K3	CO1
			(OR)			
	b)	i.	Define Rolle's theorem and verify the same for $\frac{\sin x}{e^x}$ in $(0,\pi)$	8	K1	CO1
		ii.	Apply Mean Value theorem for e^x in (a, b)	8	K3	CO1
12.	a)	i.	The temperature T at any point (x, y, z) in space is $T = 400\,xyz^2$. Find the highest temperature on the surface of the unit sphere $x^2 + y^2 + z^2 = 1$.	8	K1	CO2
		ii.	Build $x^2y+3y-2$ in powers of $x-1$ *and* $y+2$ by using Taylor's series.	8	K3	CO2
			(OR)			
	b)	i.	If $u=\frac{yz}{x}$, $v=\frac{zx}{y}$, $w=\frac{xy}{z}$, then find the value of $\frac{\partial(u,v,w)}{\partial(x,y,z)}$.	8	K1	CO2
		ii.	Construct the maxima and minima of $xy(a-x-y)$	8	K3	CO2
13.	a)		Evaluate			
		i.	$\int_0^{\infty} x\,e^{-x^2}\,dx$	4		
		ii.	$\int_0^{\frac{\pi}{2}} \log\tan x\,dx$	4	K5	CO3
		iii.	$\int_0^{\frac{\pi}{2}} \frac{\sin 2\theta}{\sin^4\theta+\cos^4\theta}\,dx$	4		
		iv.	$\int \frac{x}{\left(x^2+1\right)^{\frac{3}{2}}}dx$	4		

(OR)

b)	i.	Evaluate 1) $\int_0^a \frac{x^7}{\sqrt{a^2-x^2}}dx$ 2) $\int_0^{\pi} \frac{\sqrt{1-\cos x}}{1+\cos x}\sin^2 x\,dx$	8	K5	CO3
	ii.	Test the convergence of the series $\frac{1}{1^1}+\frac{1}{2^2}+\frac{1}{3^3}+\frac{1}{4^4}+....$	8	K4	CO3
14. a)	i.	Evaluate $\int_0^{\infty}\int_0^{\infty} e^{-(x^2+y^2)}dxdy$ by changing into polar coordinates and hence evaluate $\int_0^{\infty} e^{-x^2}dx$.	8	K5	CO4
	ii.	Change the order of integration in $\int_0^{4a}\int_{x^2/4a}^{2\sqrt{ax}} dy\,dx$ and evaluate it	8	K5	CO4
		(OR)			
b)	i.	Evaluate $\int_0^1\int_0^{1-x}\int_0^{1-x-y} xyz\,dx\,dy\,dz$..	8	K5	CO4
	ii.	Find the volume of tetrahedron bounded by the plane $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=1$ and the coordinate planes.	8	K5	CO4
15. a)	i.	Solve $\frac{d^2y}{dx^2}+y=x\sin x$ by the method of variation of parameter.	8	K3	CO5
	ii.	Solve $\frac{d^2y}{dx^2}-5\frac{dy}{dx}+6=e^x\cos 2x$	8	K3	CO5
		(OR)			
b)	i.	Solve $x^2\frac{d^2y}{dx^2}-x\frac{dy}{dx}+y=\left(\frac{\log x}{x}\right)^2$	8	K3	CO5
	ii.	Solve $(x+1)^2\frac{d^2y}{dx^2}+(x+1)\frac{dy}{dx}+y=4\cos[\log(1+x)]$	8	K3	CO5