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(2)

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: 8011

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 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.	Illustrate the symbol of the following Power Semi-Conductor Devices: SCR, GTO, N-channel MOSFET, and N-channel IGBT.	2	K2	CO1
2.	How IGBT is differed from MOSFET.	2	K2	CO1
3.	Illustrate the input voltage, output voltage and output current waveforms of a Half wave, Half controlled bridge converter with R load.	2	K2	CO2
4.	How do you obtain a 12 V DC from a 1-phase, 230 V, 50 Hz AC using power converters? Draw the schematic.	2	K3	CO2
5.	What is an isolated DC-DC converter? Give two examples.	2	K2	CO3
6.	How do you obtain a 6 V DC from a 12 V DC using a DC chopper? Draw the circuit and output waveforms.	2	K3	CO3
7.	List different types of inverters.	2	K1	CO4
8.	Define harmonics. List the effects of harmonics on the electrical system.	2	K1	CO4
9.	How do you control the speed of a 1-phase, 230 V, 50 Hz fan by using a suitable power converter? Draw the output voltage waveform of that power converter.	2	K4	CO5
10.	Infer the benefits of matrix converters.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	Explain the construction and operation of IGBT with necessary diagram.	7	K2	CO1
		ii.	Explain the gate-source and drain-source characteristics of MOSFET.	6		
			(OR)			
	b)	i.	Explain the dynamic characteristics of schottky diode with a neat circuit diagram.	7	K2	CO1
		ii.	Explain the operation and characteristics of a SCR.	6	K2	
12.	a)	i.	Explain the operation of a fully-controlled rectifier with neat waveforms.	7	K2	CO2
		ii.	Develop an expression of the output voltage with respect to the firing angle α for the fully controlled rectifier.	6	K3	
			(OR)			
	b)	i.	Explain the operation of a three -phase controlled rectifier with necessary diagrams.	7	K2	CO2
		ii.	Develop an the expression of the output voltage with respect to the firing angle α.	6	K3	
13.	a)	i.	Explain the different modes of operation of Fly back converters.	7	K3	CO3
		ii.	Design a suitable DC-DC power converter topology for charging an EV battery of 48 V from a 230 V, 50 Hz AC grid.	6	K3	
			(OR)			
	b)	i.	A 48 V solar PV array is powering a 12 V battery through a DC-DC converter. What type of DC-DC converter is employed in this application and model the same converter?	8	K3	CO3
		ii.	Also, explain the operation of that DC-DC converter with a neat circuit diagram and waveforms.	5	K3	
14.	a)	i.	Explain the operation of a five level DC-AC converter which employs a cascaded H-bridge inverter topology.	8	K2	CO4
		ii.	Why sine wave inverter gives a superior performance than a square wave inverter. Analyze the reasons.	5	K4	
			(OR)			
	b)	i.	Explain 180° operation of a three-phase inverter with neat circuit and output wave forms.	8	K2	CO4
		ii.	Also, develop an expression of output voltage in terms of voltage across the DC bus voltage.	5	K3	

15.	a)	The speed of a 5 HP, 400 V induction motor is controlled using the principle of v/f control. The motor is powered from the utility grid. Model the block diagram of the speed control mechanism using suitable power converter and explain the operation.	13	K3	CO5
		(OR)			
	b)	i. Explain the operation of a single phase cycle converter with a neat circuit diagram and output waveforms.	7	K2	CO5
		ii. Model a suitable single phase voltage regulator (full wave) to power a RL load.	6	K3	

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Develop a suitable SMPS system to power a 100 W system with output voltages of 5 V, 12 V and 24 V DC from a 230 V, 50 Hz AC supply. Assume necessary data, if required.	15	K3	CO4
		(OR)			
	b)	A 3000 W solar photovoltaic (PV) system is powering a 3 HP, 400V, 50 Hz induction motor. Model a block diagram of the above drive system. Assume necessary data, if required.	15	K3	CO4

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

Question Paper Code: 5019

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2023
Fifth semester
Electrical and Electronics Engineering
U19CSOE2 - ETHICAL HACKING
(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.	Differentiate between symmetric and asymmetric encryption.	2	K2	CO1
2.	List the types of cryptography attacks?	2	K1	CO1
3.	What is meant by foot printing? Give example.	2	K2	CO2
4.	What is the security feature available in Windows 7?	2	K3	CO2
5.	What is the use of a honey pot?	2	K2	CO3
6.	Distinguish between human based attack and computer-based attack.	2	K2	CO3
7.	What is physical security?	2	K3	CO4
8.	What happens if a web server is hacked?	2	K4	CO4
9.	Differentiate viruses and worms.	2	K3	CO5
10.	Give some penetration testing tools.	2	K3	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	What is ethical hacking? Write its types. Explain the working of any four types of ethical hacking.	7	K1	CO1
		ii.	How is digital signature different from conventional signature? Explain with examples.	6	K2	CO1

			(OR)			
	b)		What is a PKI? Explain its working principle with appropriate diagrams.	13	K2	CO1
12.	a)	i.	Explain the procedure of DNS foot printing	7	K2	CO2
		ii.	What is port scanning? What are its types? List the tools used in port scanning.	6	K2	CO2
			(OR)			
	b)		With an examples, discuss in detail about of various types of enumeration techniques.	13	K3	CO2
13.	a)	i.	Explain the any five network sniffing tools	7	K3	CO3
		ii.	With an example explain about DoS attack.	6	K3	CO3
			(OR)			
	b)		With appropriate diagrams, explain the working, classification and benefits of IDS.	13	K4	CO3
14.	a)		What are the steps required to hack a web server? Explain. Also discuss about the counter measures.	13	K3	CO4
			(OR)			
	b)	i.	What are the most common types of wireless attacks?	7	K3	CO4
		ii.	Explain the working of Bluesnarfing attack through Bluetooth.	6	K4	CO4
15.	a)		What is malware? List out its types? How to stay protected from malware? Explain.	13	K3	CO5
			(OR)			
	b)		Discuss the different phases involved in penetration testing. Give example.	13	K3	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.			Questions	Marks	KL	CO
16.	a)		What is cryptography? Discuss in detail about the types, principles, challenges and applications of cryptography.	15	K4	CO1
			(OR)			
	b)	i.	With a neat diagram, explain the working of a firewall	7	K3	CO3
		ii.	What are the types of a firewall? Discuss about the advantages, disadvantages and real time applications of a firewall.	8	K4	CO3

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Question Paper Code: 5018

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. DEC. 2023
Fifth Semester
Electrical and Electronics Engineering
U19CSOE1 - INTRODUCTION TO IoT
(Common to ECE, BME & BT)
(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.	Enlist the six elements of IoT ecosystem.	2	K2	CO1
2.	What are various the connecting devices and their types?	2	K2	CO1
3.	What are all the various communication technologies?	2	K3	CO2
4.	Differentiate between Sensors and actuators. Provide one example for each.	2	K3	CO2
5.	Classify the various steps in IoT design methodology.	2	K3	CO3
6.	Provide four cloud deployment models.	2	K3	CO3
7.	Differentiate between security and privacy.	2	K2	CO4
8.	How does the secure authentication id is offered in a constraint device environment?	2	K2	CO4
9.	What do you mean by data acquisition?	2	K1	CO5
10.	Enlist six IoT Applications is medical domain.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Discuss in details the building blocks of IoT system. Also, provide the characteristics of IoT systems.	13	K2	CO1

		(OR)			
	b)	Elaborate design principles for connected devices for the implementation of IoT system. How, web thinking for the connected devices are applied and analyzed?	13	K2	CO1
12.	a)	Discuss the different IoT communication models in details with real-time examples.	13	K3	CO2
		(OR)			
	b)	Explicate the functions and working of the application layer protocols CoAP and MQTT in IoT communication, specify the applications as well.	13	K3	CO2
13.	a)	Provide the implementation details of Cloud computing and Edge computing in the development of IoT system along with 2 examples in each category.	13	K3	CO3
		(OR)			
	b)	How the Topologies of the Cloud Data Normalization is utilized and discuss the necessity of Protocol Translation in IoT ecosystem.	13	K3	CO3
14.	a)	If you have the data of Security Agency - AIA obtained from the IoT enable system. Analyze and evaluate the various Privacy-Preserving sharing of all the IoT data generated from the system, so that the data of the AIA will be secure.	13	K3	CO4
		(OR)			
	b)	Consider the recourse constraint devices to offer the security in terms of Secure Authentication and Access Control. Apply and analyze the various authentication parameters selected or needed for the secure authentication. Also, discuss the suitable access control mechanism needs to be enabled to access the system.	13	K4	CO4
15.	a)	Elaborate, how industries can be benefitted from IoT. Give two suitable applications in medical domain compare traditional systems with the concept of IoT.	13	K3	CO5
		(OR)			
	b)	Explain designing of smart street lights in smart city. Also, discuss interoperability in detail. Why it is essential in IoT?	13	K3	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Design an application using IoT and cloud computing for health monitoring system. The various health monitoring devices will be installed on the human body. Determine the IoT-levels needed for the design of system. Give the design model of complete system using various sensor, network topology / protocol, etc. Specify how you will build the system for collecting data, processing data, analyzing data and generating useful information.	15	K4	CO5
		(OR)			
	b)	Design an application using IoT and cloud computing for Air Quality and the monitoring of pollutants that can cause health issues. The governments and regulators are keen to monitor and manage the impacts of poor air quality caused by a range of pollutants. Determine the IoT-levels needed for the design of system. Give the design model of complete system using various sensor, network topology / protocol, etc. Specify how you will build the system for collecting data, processing data, analyzing data and generating useful information.	15	K4	CO5

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Question Paper Code: 9015

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2023
Fifth Semester
Electrical and Electronics Engineering
U19BTOE1 – BIOLOGY FOR ENGINEERS
(Common to ECE & BME)
(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 features of a eukaryotic cell.	2	K1	CO1
2.	Describe the functions of a nucleus.	2	K2	CO1
3.	Draw and label the parts of respiratory system.	2	K1	CO2
4.	Define uniport.	2	K2	CO2
5.	How are T cells formed?	2	K1	CO3
6.	Brief on the commercial importance of fungi.	2	K2	CO3
7.	Classify the types of biomaterials used widely in medical applications.	2	K2	CO4
8.	Name some of the nitrogen fixing bacteria.	2	K1	CO4
9.	Define totipotency.	2	K1	CO5
10.	List few SOP to be adopted to minimize hazard.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	Describe the importance of microscope in the field of biology.	4	K2	CO1
		ii.	Brief on the working of a light microscope.	9	K3	CO1

(OR)

b)	i.	Highlight the function of lysosome and mitochondria in a cell.	7	K1	CO1
	ii.	Describe the fluid mosaic model of plasma membrane.	6	K2	CO1
12. a)		Define cell proliferation. Illustrate the various stages of cell cycle.	13	K1	CO2
		(OR)			
b)	i.	Elaborate on the working of human excretory system.	9	K2	CO2
	ii.	Describe any 2 disease associated with excretory system.	4	K2	CO2
13. a)	i.	Skin is the first line of defense system of human body. Justify.	5	K2	CO3
	ii.	Explain the working of the various components of innate immune system.	8	K2	CO3
		(OR)			
b)		Illustrate the activation of T-cells with a neat diagram.	13	K1	CO3
14. a)	i.	Brief on the various components of a biosensor.	7	K2	CO4
	ii.	Classify biofuels based on the various types biomass used as a source.	6	K2	CO4
		(OR)			
b)	i.	Describe the working mechanism of any one macromolecular machine.	7	K2	CO4
	ii.	Elaborate any biological method adopted in the synthesis of nanoparticles.	6	K2	CO4
15. a)	i.	Compare the working of artificial neural network with nervous system. List its applications.	6	K2	CO5
	ii.	Brief on the contribution of Gregor Mendel in the field of genetics.	7	K1	CO5
		(OR)			
b)		Explain the various steps involved in the genetic engineering of a microorganism.	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16. a)		Define regenerative medicine. Describe the application of stem cells in the treatment of ailments with suitable example.	15	K2	CO5
		(OR)			
b)		Explain what happens when a ligand binds to the receptor and provide the cell signaling mechanism.	15	K2	CO2

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Question Paper Code: 8006

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 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.	Define interrupt latency? How to avoid it.	2	K1	CO1
2.	What are the points to be considered while connecting power supply rails with embedded system?	2	K2	CO1
3.	Compare serial port and parallel port.	2	K1	CO2
4.	What are the different modes of operations in Serial Interface port?	2	K1	CO2
5.	What is meant by pointer and null pointer and give its syntax?	2	K1	CO3
6.	List out the various types of models in program model.	2	K2	CO3
7.	How does a task differ from a thread?	2	K1	CO4
8.	Differentiate counting semaphore and binary semaphore.	2	K2	CO4
9.	List out the features of automotive embedded system.	2	K2	CO5
10.	What are the various models used in the design of embedded system?	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	How to select the processor based upon its architecture and applications?	13	K1	CO1
		(OR)			
	b)	Explain in detail about design life cycle in embedded system.	13	K1	CO1
12.	a)	Describe the frame format and working of I2C Protocol with features.	13	K2	CO2
		(OR)			
	b)	Describe the CAN protocol bringing out the architecture, message formats and error detection on detail.	13	K2	CO2
13.	a)	Explain briefly about State machine programming models for event controlled program flow.	13	K1	CO3
		(OR)			
	b)	List the types of modifiers and explain the actions, uses for software programming.	13	K1	CO3
14.	a)	Explain the cooperative scheduling and round robin scheduling with a suitable diagram.	13	K1	CO4
		(OR)			
	b)	Elaborate the Interrupt routines in RTOS environment and handling of interrupt source calls.	13	K1	CO4
15.	a)	Sketch the operation / functional stages of a washing machine through a block diagram and brief about the various design process.	13	K2	CO5
		(OR)			
	b)	Explain briefly about various design process in ATM machine.	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Recall the features of VxWorks and explain detail about different functions used in VxWorks RTOS?	15	K4	CO4
		(OR)			
	b)	Explain in detail about various functions of MUCOS-II in RTOS.	15	K4	CO4

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Question Paper Code: 8005

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2023
Seventh Semester
Electrical and Electronics Engineering
U19HS704 – TOTAL QUALITY MANAGEMENT
(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.	Label the dimensions of product quality.	2	K1	CO1
2.	List out the elements of Juran's contribution.	2	K1	CO1
3.	Infer the ways in which employee involvement can be improved in an organization.	2	K3	CO2
4.	Show the requirements of reliable supplier rating.	2	K2	CO2
5.	Define process capability.	2	K1	CO3
6.	Recall the term business process improvement.	2	K1	CO3
7.	List out the benefits of QFD.	2	K1	CO4
8.	Show the various types of FEMA.	2	K1	CO4
9.	Summarize the important requirements of ISO 9000.	2	K2	CO5
10.	Show the different types of quality audits.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Recall the underlying principles of TQM.	13	K1	CO1
		(OR)			
	b)	Label the barriers of TQM.	13	K1	CO1

12.	a)	Recall the term quality statements and elaborate them with suitable examples.	13	K1	CO2
		(OR)			
	b)	Label the term 5S and explain the elements 5S.	13	K1	CO2
13.	a)	Explain in detail the measurement phase of process capability.	13	K2	CO3
		(OR)			
	b)	Interpret the pillars of TPM in detail.	13	K2	CO3
14.	a)	Recall house of quality with an appropriate example of your choice.	13	K1	CO4
		(OR)			
	b)	Label the objectives and stages of FEMA.	13	K1	CO4
15.	a)	Show the various elements of ISO 9000-2000 quality system.	13	K2	CO5
		(OR)			
	b)	Classify the documents to be prepared in QMS.	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	"TQM is an Expense in Business Organisation" — Define.	15	K1	CO1
		(OR)			
	b)	Amit Verma joined ABC Technologies in January after having worked at HKY Computers where he had worked as an Software developer. Amit felt that ABC offered better career prospects, as it was growing much faster than HKY which was a relatively smaller company. Amit joined as a Senior Software Developer at ABC Technologies with a good pay hike. He joined Archita Mehta's five-member team. While she was efficient at what she did and extremely intelligent, she had neither the time nor the leaning to groom her team members. Time and again, Amit found himself thinking of Ram Kapoor, his old boss, and of how he had been such a positive influence. Archita, on the other hand, even without actively doing anything, had managed to significantly lower his motivation levels. 1. Outline the reasons for Amit feeling disillusioned. Answer the questions using Maslow's hierarchy of needs. 2. Explain the things to be done by Amit to overcome his tension. What can a team leader do to ensure high levels of motivation among his/her team members interpret?	7+8	K2	CO2

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Question Paper Code: 9007

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2023
Seventh Semester
Electrical and Electronics Engineering
U19BTOE9 – BIODIVERSITY AND BIOPROSPECTING
(Common to ECE & BME)
(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 meant by biodiversity hotspots?	2	K1	CO1
2.	Write a short note on Vegetational Zones.	2	K2	CO1
3.	Justify the need for Taxonomical hierarchy.	2	K4	CO2
4.	Define Species.	2	K1	CO2
5.	State the fundamental argument of selfish gene theory.	2	K2	CO3
6.	In what way Neo-Darwinism differs from Darwinism?	2	K2	CO3
7.	Mention the criteria for the classification of fungi.	2	K2	CO4
8.	List the different classes of virus.	2	K1	CO4
9.	Give an example for bioprospecting.	2	K2	CO5
10.	Name the Act applicable to the conservation of Biodiversity and Genetic resources in India.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)		Write about the major biodiversity zone in India. How can you protect them?	13	K2	CO1
			(OR)			
	b)		Biodiversity as a natural resource- Provide a detailed analysis report on this statement.	13	K4	CO1
12.	a)		Write a detailed note on Animal taxonomy and its regulations.	13	K2	CO2
			(OR)			
	b)		Describe the major plant groups and their evolutionary Relationships.	13	K3	CO2
13.	a)		Explain the exponential and logistic models of Population growth.	13	K2	CO3
			(OR)			
	b)	i.	Write a note on factors affecting diversity.	5	K3	CO3
		ii.	What are the effects of natural selection on populations?	8		
14.	a)	i.	Write about the vegetative forms of fungi.	8	K3	CO4
		ii.	Why spores are essential for fungi?	5		
			(OR)			
	b)	i.	Classify the bacteria into various groups.	5	K2	CO4
		ii.	Write a note on staining methods useful for the classification of bacteria.	8	K2	
15.	a)		Give a detailed note on phases of Bioprospecting.	13	K2	CO5
			(OR)			
	b)		Bioprospecting is useful for the conservation of Biodiversity and Genetic resources – justify with a detailed note.	13	K4	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Write a case study on the impact of exotic fishes on Indian waterbodies. How does natural selection play a role?	15	K5	CO3
		(OR)			
	b)	Write a detailed note on the impact of spontaneous mutation that enhanced the growth and survival of a carnivore- e.g., wolf, in a forest. How this mutation would shape the ecology of the forest?	15	K5	CO3

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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: 8008

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 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.	List the control and status signal of 8085 microprocessor and mention its need?	2	K1	CO1
2.	What is the function of ALE in 8085 microprocessor?	2	K2	CO1
3.	How is time delay generated using subroutines?	2	K2	CO2
4.	Why do we use XRAA instruction?	2	K2	CO2
5.	Give the details of PSW of 8051.	2	K1	CO3
6.	State the function of RS1 and RS0 bits in the flag register of Intel8051microcontroller.	2	K1	CO3
7.	List the four display modes of 8279 keyboard and display controller.	2	K1	CO4
8.	Draw the format of Read back Command register of 8254.	2	K1	CO4
9.	What are the control signals from 8051 microcontroller required for washing machine control?	2	K2	CO5
10.	How pulse is generated using 8051 microcontroller?	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Illustrate neat block diagram of 8085 microprocessor and explain its internal architecture.	13	K1	CO1

(OR)

	b)	Draw the pin diagram of 8085 μP and explain the functionality of each pin.	13	K1	CO1
12.	a)	Develop an algorithm and 8085 assembly language program to sort 100 byte type data. Explain the instruction used in the program.	13	K2	CO2
		(OR)			
	b)	Write an 8085 assembly language program to find the largest among 'N' number where the value of N should be stored in 4200 and the array of elements from 4201. Store the result in 4300.	13	K2	CO2
13.	a)	Describe the timing diagram of external data memory read cycle of 8051.	13	K1	CO3
		(OR)			
	b)	Explain various I/O ports and its functions of 8051 microcontroller.	13	K1	CO3
14.	a)	Describe the 8255 programmable peripheral interface and its operating modes.	13	K1	CO4
		(OR)			
	b)	Discuss how 8257 is interfaced with 8085 and also explain the various register formats.	13	K1	CO4
15.	a)	Design the interfacing of a 8051 based traffic light control system with necessary diagram.	13	K2	CO5
		(OR)			
	b)	Explain with neat diagram the closed loop control of servo motor using 8051 microcontroller.	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Interface 8 bit, 8 channel ADC to 8051, Write an ALP to convert Sensor data from various input devices through CH0, CH3 and CH7 channel to digital data and store them in external memory location starting from C000H, Repeat procedure for every 1 sec.	15	K3	CO5
		(OR)			
	b)	Sixty-four keys are to be interfaced with 8051 arranged in a 8 x 8 matrix. Give a schematic of the hardware interfacing. Develop a software to generate unique key code for any key pressed. The key code must be fully de bounced.	15	K3	CO5

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Question Paper Code: 8016

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2023
Fourth Semester
Electrical and Electronics Engineering
U19EE412 – TRANSMISSION AND DISTRIBUTION OF ELECTRICAL ENERGY
(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 skin effect? On which factors does it depend?	2	K2	CO1
2.	What are the advantages of bundled conductors?	2	K1	CO1
3.	Differentiate voltage stability and rotor angle stability.	2	K2	CO2
4.	List the four parameters by which the performances of transmission lines are governed.	2	K2	CO2
5.	State any two properties of insulating materials.	2	K2	CO3
6.	Give the relation for the insulation resistance of a cable.	2	K2	CO3
7.	Enlist any two factors that affect sag in transmission line.	2	K1	CO4
8.	Write down the different types of grounding.	2	K2	CO4
9.	List out any two merits and demerits of HVDC transmission.	2	K2	CO5
10.	What are the objectives of FACTS?	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No	Questions	Marks	KL	CO
11. a)	Derive the expression for inductance of a unsymmetrically spaced three phase three wire transmission line.	13	K3	CO1

(OR)

b)	i.	Calculate the loop inductive reactance per phase per km of a single phase transmission line consisting of two parallel conductors 1.5 m apart and 1.5 cm in diameter. Calculate also the Reactance of the transmission line if it is operating at a frequency of 50 Hz.	7	K4	CO1
	ii.	A single phase transmission line has two parallel conductors 3 m apart, the radius of each conductor being 1 cm. Calculate the capacitance of the line per km. R = 1 cm, D = 3 m.	6	K4	CO1
12. a)		Derive the expression for efficiency and regulation of long transmission line using rigorous method.	13	K3	CO2
		(OR)			
b)		A 3 phase 50 Hz 100 Km long overhead line has the following line constants; resistance per phase per km = 0.153 ohm, inductance per phase per km = 1.21 mH, capacitance per phase per km = 0.00958 μF. The line supplies a load of 20 MW at 0.9 pf lagging at a line voltage of 110 KV at the receiving end. Using nominal л representation. Calculate sending end voltage, current, pf, regulation and efficiency.	13	K4	CO2
13. a)		A 3 phase overhead transmission line is being supported by three disc insulators. The potentials across top unit and middle unit are 9 kV and 11 kV respectively. Calculate i. the ratio of capacitance between pin and earth to the self-capacitance of each unit. ii. the line voltage. iii. the string efficiency.	13	K4	CO3
		(OR)			
b)		Elucidate the methods of improving string efficiency.	13	K2	CO3
14. a)		Assume that the shape of an overhead line is approximated by a parabola; deduce expression for sag and conductor length. How can the effect of wind be taken into account?	13	K3	CO4
		(OR)			
b)		Explain the key points to be considered for tower spotting. Also list the basic types of tower based on type of circuits.	13	K2	CO4
15. a)		Illustrate the layout of AIS & GIS substation and explain the structure of any one.	13	K2	CO5
		(OR)			
b)		Explain the different types of links of HVDC transmission.	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No		Questions	Marks	KL	CO
16.	a)	Compare AC and DC distribution systems.	15	K4	CO5
		(OR)			
	b)	Calculate the horizontal component of tension and maximum sag for a span of 300 m if the maximum tension in the conductor be 3500 kg and weight of conductor is 700 kg/km. Determine also the location of the points on the conductor at which the sag will be half of the above value.	15	K4	CO4

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Question Paper Code: 8015

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2023
Fifth Semester
Electrical and Electronics Engineering
U19EEV38 – INTELLECTUAL PROPERTY RIGHTS
(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.	Relate creativity with innovation.	2	K2	CO1
2.	Classify different types of intellectual properties.	2	K2	CO1
3.	Recall the meaning of 'Non Obviousness' while granting Patents.	2	K1	CO2
4.	List the four items of India that are granted with 'Geographical indications' tag.	2	K1	CO2
5.	Does copyright apply to titles and names? Interpret.	2	K2	CO3
6.	Infer the issues of copyright ownership.	2	K2	CO3
7.	Distinguish between a trade name and business name.	2	K4	CO4
8.	Show the laws that govern the trade secrets.	2	K2	CO4
9.	Identify the various government schemes in IPR.	2	K3	CO5
10.	Organize the different career opportunities in IP.	2	K3	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	TRIPS Agreement governs and protect the IPR in global countries, sometimes it critiqued by some situations" – How do you judge this statement? Illustrate with examples.	13	K2	CO1

(OR)

	b)	Explain the trade secret law and the liability for misappropriations of trade secrets.	13	K2	CO1
12.	a)	Define the term not Patentable. List out the inventions not patentable as laid down in the Indian Patent Act, 1970.	13	K1	CO2
		(OR)			
	b)	"Managing the patent is exercised by the patent offices and patent attorney offices" – Summarize.	13	K2	CO2
13.	a)	Analyze detail about copy right law and ownership issues in transfer of copy rights along with moral rights of the author.	13	K4	CO3
		(OR)			
	b)	Inspect the different process, procedures and documents associated with copyright.	13	K4	CO3
14.	a)	Imagine that you are starting a business. Summarize the different types of marks which you can make use of.	13	K2	CO4
		(OR)			
	b)	With the help of an example, explain the process for acquisition of trademark rights.	13	K2	CO4
15.	a)	'India has to go a long way in the enforcement of intellectual property rights'. Do you agree? Examine in detail.	13	K4	CO5
		(OR)			
	b)	What are the current issues on intellectual property rights? Explain them in detail.	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	"Protecting the created intellectuality is a challenge now-a-days, because of the cloning of one's idea is easier than the new creation" – How this statement is realistic in practicing business? Interpret.	15	K2	CO1
		(OR)			
	b)	A lecturer is an active member of a discussion forum hosted in the Warwick Forums system. The forum is open to all members of the university. It is a very popular forum, with people from across Engineering and the Warwick Manufacturing Group participating. Such a diverse collaboration of knowledge and skills often leads to new perspectives on old problems. One particular problem seems to be quite intractable, so the lecturer posts a long description of it on the forum. She already has some possible solutions, but just needs a little input from elsewhere. The tactic works, an MSc student offers an unusual insight that inspires a solution from the lecturer.			

A journal paper follows, along with, a year later, an unusual email from the exams secretary. The student has been accused of plagiarizing from the journal article. The Plagiarism seems to be quite clever, but the ideas are the same and a few sentences are shared. When the lecturer looks at the student's essay, it appears that some of it has been copied from the forums discussion.

Question :

i.	What factors should be considered in resolving this? Justify	8	K4	CO5
ii.	Inspect what could have been done differently.	7		

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Question Paper Code: 8020

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2023
Sixth Semester
Electrical and Electronics Engineering
U19HS603 – PRINCIPLES OF MANAGEMENT
(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)

S.No.	Questions	Marks	KL	CO
1.	Define management according to Knootz and Weihrich.	2	K2	CO1
2.	Examine some characteristics of Management.	2	K4	CO1
3.	What are the objectives of planning?	2	K2	CO2
4.	What are the benefits of objective setting?	2	K3	CO2
5.	What is splintered authority?	2	K4	CO3
6.	How informal organization characteristics differ from formal organization?	2	K1	CO3
7.	Distinguish between motivation and satisfaction.	2	K4	CO4
8.	List out the importance of leadership.	2	K1	CO4
9.	Mention any two requirements for effective control.	2	K1	CO5
10.	Compare budget and non-budgetary control techniques.	2	K4	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	Summarize Henry Fayol's principles of management.	8	K4	CO1
		ii.	Enumerate the process of management in different levels.	5		

(OR)

	b)	i.	Classify the roles of manager in an organization according to Henry Mintzberg.	8	K4	CO1
		ii.	Explain the different kinds of skills required by a manager.	5		
12.	a)	i.	Explain with flow diagram the steps in planning.	8	K3	CO2
		ii.	Discuss the factors for strategies policies and planning premises.	5		
			(OR)			
	b)	i.	Define decision making process. Explain the process followed while taking a decision in normal situation.	7	K2	CO2
		ii.	Discuss tangible and intangible factor relevant to decision making.	6		
13.	a)	i.	Compare formal and informal types of organizations.	13	K3	CO3
		ii.	Explain the different forms of organizational structures prevalent in Indian organizations.			
			(OR)			
	b)	Discuss the following processes involved in HR management			K3	CO3
		i.	Planning and Recruitment	5		
		ii.	Performance Management	8		
14.	a)	Extend the communication process and classify the barriers for communication.		13	K3	CO4
			(OR)			
	b)	Summarize the group and individual behavior of employees in an organization.		13	K3	CO4
15.	a)	Explain the different types of performance control tools used for monitoring and measuring organizational performance.		13	K4	CO5
			(OR)			
	b)	Compare the following controlling techniques.		13	K4	CO5
		i.	Budgetary control			
		ii.	Non-budgetary control			

PART – C

(1 x 15 = 15 Marks)

S.No.		Questions	Marks	KL	CO
16.	a)	Analyze in detail about any three motivational theories.	15	K4	CO4
		(OR)			
	b)	Define leadership. Explain in detail about types of Leadership.	15	K3	CO3

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Question Paper Code: 8017

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2023
Sixth Semester
Electrical and Electronics Engineering
U19EE622 - GENERATION OF ELECTRICAL ENERGY
(Regulation2019)

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 load duration curve.	2	K1	CO1
2.	Calculate the total energy generated if the maximum demand on a power station is 120 MW and the annual load factor is 50%.	2	K2	CO1
3.	List the components of nuclear reactor.	2	K1	CO2
4.	What are the factors to be considered while selecting a site for steam power plants?	2	K2	CO2
5.	Find the maximum output power from a 1.2 V, 0.65 A solar cell.	2	K3	CO3
6.	What is Azimuth angle in solar system?	2	K2	CO3
7.	Mention two important wind turbine generator installations in India.	2	K1	CO4
8.	List the various components of wind energy system.	2	K1	CO4
9.	List the factors affecting energy consumption.	2	K2	CO5
10.	Define micro grid.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	The daily demand of three consumers is given below.	13	K3	CO1

Time	Consumer 1	Consumer 2	Consumer 3
12 midnight-8am	No load	200 W	No load
8am-2pm	600 W	No load	200 W
2pm-4pm	200 W	1000 W	1200 W
4pm-10pm	800 W	No load	No load
10pm-12 midnight	No load	200 W	200 W

Find

i. Maximum demand of individual consumer.
ii. Diversity factor.
iii. Load factor of each consumer and station.

(OR)

	b)	The yearly load duration curve of a power plant is a straight line (fig 1.1). The maximum load is 30 MW and the minimum load is 20 MW. The capacity of the plant is 35 MW. Calculate the plant capacity factor, load factor and utilization factor.	13	K3	CO1

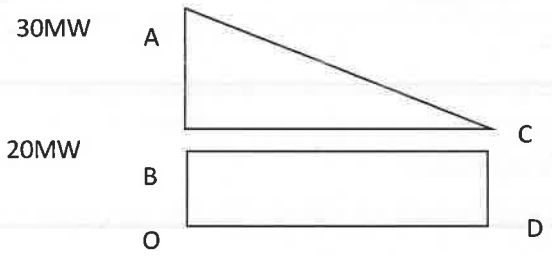

fig 1.1

12.	a)	Draw the layout diagram of hydro power plant and also explain the components and working of hydro power plant.	13	K2	CO2

(OR)

	b)	Draw and explain block diagram of nuclear power plant and write few advantages and disadvantages.	13	K2	CO2
13.	a)	Estimate watt-hour per day, energy needed from PV panels, no. of panels, inverter sizing, battery sizing, charge controller sizing and design a PV system of i. 45 W incandescent lamp used for 5 hours per day. ii. 60 W of fan used for 7 hours per day. iii. 75 W of refrigerator used for 24 hours per day. iv. Two 15 W CFL lamp used for 6 hours per day. The panel rating is 110 W, 12 VDC, I_{sc} = 7.5 A, Day of autonomy is 2.	13	K3	CO3

(OR)

	b)	Classify various types of MPPT algorithms. Explain Perturb & Observe and Incremental Conductance algorithm with necessary equations and flow chart.	13	K3	CO3
14.	a)	Explain the construction and working principle of wind energy power plant.	13	K2	CO4
		(OR)			
	b)	Derive the calculation of power in wind, instantaneous power, power coefficient and condition for maximum power.	13	K2	CO4
15.	a)	Explicate about micro grid used for power generation.	13	K2	CO5
		(OR)			
	b)	Elucidate about biomass methodology used for power generation.	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	A generating station has a maximum demand of 25 MW. The load factor is 60 %, plant use factor is 75 % and plant capacity factor is 50 %. Find the reserve capacity and daily energy produced.	15	K3	CO1
		(OR)			
	b)	A residential consumer has 12 lamps of 40W each connected at his permises. His demand is as follows. From 12 midnight to 5 AM – 80 W From 5 AM to 6 PM –No Load From 6 PM to 7 PM – 320 W From 7 PM to 9 PM – 360 W From 9 PM to 12 midnight – 120 W Draw the load and load duration curve and find average load, maximum load, load factor, electrical energy consumption per day.	15	K3	CO1

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Question Paper Code: 8018

B.E. / B.Tech. DEGREE END-SEMESTEREXAMINATIONS – NOV. / DEC. 2023
Fourth Semester
Electrical and Electronics Engineering
U19EE410 – LINEAR INTEGRATED CIRCUITS
(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL 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.	Question	Mark	KL	CO
1.	Define CMRR.	2	K1	CO1
2.	Assume that an op amp has I_{B1} = 400 nA and I_{B2} = 300 nA. Determine the average bias current and offset current.	2	K2	CO1
3.	Why negative feedback is used in amplifiers?	2	K2	CO2
4.	Draw a subtractor circuit using op-amp.	2	K1	CO2
5.	Define precision diode.	2	K1	CO3
6.	List out the applications of comparator.	2	K1	CO3
7.	Define conversion time of an A-D converter.	2	K1	CO4
8.	Draw the general block diagram of IC723 voltage regulator.	2	K1	CO4
9.	List out the types of multi vibrators.	2	K1	CO5
10.	Define lock and capture range of a PLL.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Question	Mark	KL	CO
11.	a)	Explain the functions of all the building blocks of operational amplifier.	13	K2	CO1

(OR)

	b)	Discuss in detail about the DC performance characteristics of operational amplifier.		13	K2	CO1
12.	a)	With neat circuit diagram explain the operation of instrumentation amplifier and derive its expression for output voltage.		13	K2	CO2
			(OR)			
	b)	i.	Derive the expression for closed loop gain of an inverting and non-inverting operational amplifier.	7	K2	CO2
		ii.	Explain the working of voltage to current converter.	6	K2	
13.	a)	With neat waveforms explain the operation of clipper and clamper circuits.		13	K2	CO3
			(OR)			
	b)	With neat circuit diagram and waveforms analyze the operation of				
		i.	Sample and hold circuit	8	K2	CO3
		ii.	Peak Detector	5		
14.	a)	Explain in detail about any two types of analog to digital converter.		13	K2	CO4
			(OR)			
	b)	With neat waveforms explain the operation of buck and boost switching regulator and analyze the current limiting schemes.		13	K2	CO4
15.	a)	With the help of schematic circuit, explain the operation of 566 VCO. Also derive an expression for the output frequency.		13	K2	CO5
			(OR)			
	b)	List out the important features of the 555 Timer and explain about astable & monostable operation of 555 timer.		13	K3	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.			Question	Mark	KL	CO
16.	a)	i.	Design an astable multi vibrator by using 555 times to generate the output signal with frequency of 1 KHz and assume the R & C. values.	8	K3	CO5
		ii.	Explain the working of any one digital to analog converter and write their applications.	7	K2	CO4
			(OR)			
	b)	i.	Explain PLL characteristics and explain how it is used to control the speed of a motor?	15	K3	CO5
		ii.	Explain the working of voltage to current convertor.			

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Question Paper Code: 8019

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2023
Sixth Semester
Electrical and Electronics Engineering
U19EE623 – POWER SYSTEM OPERATION AND CONTROL
(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 synchronous condenser?	2	K1	CO1
2.	Write about Static VAR Compensator.	2	K1	CO1
3.	What is the purpose of economic dispatch?	2	K1	CO2
4.	What are the factors affecting the cost of generation?	2	K1	CO2
5.	Define Unit commitment.	2	K1	CO3
6.	Define crew constraints	2	K1	CO3
7.	What is the function of system monitoring?	2	K1	CO4
8.	Define alert mode.	2	K1	CO4
9.	Define state estimation	2	K1	CO5
10.	Define weighted least-squares criterion	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Explain different types of static VAR compensators with a phasor diagram.	13	K2	CO1
		(OR)			
	b)	A 3Φ, 230 kV transmission line having the following parameters operates at no-load. R = 20 Ω, X = 80 Ω, B = $4x10^{-4}$ mho. If the receiving end voltage is 210 kV find the sending end voltage representing the transmission line as π model.	13	K3	CO1

12. a) Find the economic generation schedules of three generating units in a power system to meet the system load of 925 MW. The operating limit and cost function is below — 13 K3 CO2

Operating Limits: $250\ MW \leq P_{G1} \leq 450\ MW$

$200\ MW \leq P_{G2} \leq 350\ MW$

$125\ MW \leq P_{G3} \leq 225\ MW$

Cost function is $F_1(P_{G1})=0.0048(P_{G1})^2+6.2P_{G1}+580$

$F_2(P_{G2})=0.0056(P_{G2})^2+5.5P_{G2}+640$

$F_3(PG_3)=0.0078(P_{G3})^2+6.8\ P_{G3}+820$

(OR)

b) A plant has two generators supplying the plant bus and neither is to operate below 20MW or above 155 MW. Incremental costs with P_{G1} and P_{G2} in MW are — 13 K3 CO2

$dF_1/dP_{G1}=0.16\ P_{G1}+22$ Rs/MW hr

$dF_2/dP_{G2}=0.228\ P_{G2}+16.6$ Rs/MW hr.

For economic dispatch, find the plant λ when the demand equals

(a) 35 MW

(b)125 MW

(c)250 MW

13. a) Construct the priority list for the units given below: — 13 K3 CO3

Unit	Heat rate (MBtu/hr)	Pmin	Pmax	Fuel cost
1	$510 + 7.20\ P_1 + 0.00142\ P_1^2$	150	600	1.1
2	$310 + 7.85\ P_2 + 0.00194\ P_2^2$	100	400	1.0
3	$78 + 7.97\ P_3 + 0.00482\ P_3^2$	50	200	1.2

Assume load demand is 550 MW.

(OR)

b) Create a unit commitment using the priority list method for the following three units. — 13 K3 CO3

The fuel cost equations are as follows:

Unit 1: $F1\ (P1) = 561 + 7.92\ P_1 + 0.001562\ P_1^2 150 \leq P_1 \leq 600$

Unit 2: $F2\ (P2) = 310 + 7.85\ P_2 + 0.00194\ P_2^2 100 \leq P_2 \leq 400$

Unit 3: $F3\ (P3) = 93.6 + 9.56\ P_3 + 0.005784\ P_3^2 \quad 50 \leq P_3 \leq 200$

14. a) Explain in detail about automatic substation control using SCADA. — 13 K2 CO4

(OR)

b) i. Explain the different system operating states. — 6 K2 CO4

ii. Briefly discuss the various functions of energy control centre. — 7 K2 CO4

15. a) Elaborate in detail State estimation by orthogonal decomposition algorithm. — 13 K2 CO5

(OR)

b) Explain in detail about test for bad data in power system. — 13 K2 CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Explain with a neat flowchart the procedure for finding the solution for unit commitment Problems using forward DP method.	15	K2	CO3
		(OR)			
	b)	Explain in detail about the estimation of quantities not being measured, network observability and pseudo measurements.	15	K2	CO5

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Question Paper Code: 8001

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 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.	Show the per unit impedance of the transformer referred to HV winding and LV winding is same.	2	K4	CO1
2.	What is total installed Generation capacity in India? What is the highest transmission voltage in India?	2	K2	CO1
3.	What is the need of Load Flow studies in a power systems?	2	K2	CO2
4.	Write General Load Flow equations solved by using Newton-Raphson (Polar form) method.	2	K1	CO2
5.	What is the advantage of using Z_{BUS} in symmetrical fault analysis?	2	K1	CO3
6.	Write assumptions used in Symmetrical fault analysis.	2	K1	CO3
7.	What is the need of Symmetrical components?	2	K4	CO4
8.	In a transmission line $X_1 = X_2$ and $X_0 =$ (2.5 to 3) times of X_1 Justify.	2	K2	CO4
9.	What is use of Equal Area Criterion method in Stability analysis?	2	K4	CO5
10.	Write the factors affecting Steady State Stability.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	Write advantages and limitations of Per-Unit system?	8	K1	CO1
		ii.	The primary and secondary windings of a single phase 1000 kVA, 2000 / 1000 V transformer have leakage reactance each of 2 ohms. Find the per unit reactance of the transformer.	5	K5	
			(OR)			
	b)	i.	Distinguish between Impedance diagram and reactance diagram considering a power system having (i) Generator, Transformer, Transmission line and Load?	8	K2	CO1
		ii.	What do you understand by Real-Time control of Power System? Explain.	5	K4	
12.	a)		The Figure shows single line diagram of a three-bus power system with generators at bus-1 and bus-3. The voltage at bus-1 is $1.05 \angle 0^0$ pu and at bus-3, $\mid V \mid = 1.04$ pu. Line impedances are in pu and line charging susceptances are neglected. Obtain state vector using Fast Decoupled Load Flow (FDLF) method. Use two iterations. Bus-1 is Slack bus Bus-2 is PQ bus Bus-3 is PV-bus $P_{D2} = 4$ pu and $Q_{D2} = 2$ pu $P_{G3} = 3$ pu $0 \leq Q_3 \leq 5$ pu	13	K5	CO2

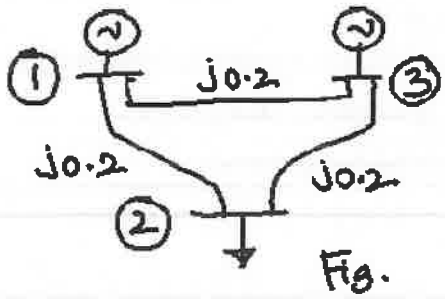
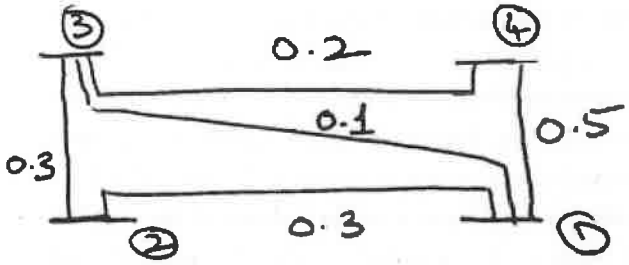


Fig.

(OR)

	b)	i.	Compare N-R (Polar form) Load Flow and N-R (Rectangular Form) Load Flow.	8	K3	CO2
		ii.	Write differences between Gauss-Seidel Load Flow and N-R (Polar form) Load Flow.	5	K4	

13.	a)	Using Z-bus building algorithm, construct Z_{BUS} for the system shown in Fig. Choose bus-4 as the reference bus.	13	K5	CO3



Fig

(OR)

	b)	Derive equations for the total fault current in terms of symmetrical components and phase quantities for the faults at bus 'p' for a general system. (i) Line-to-Line fault and (ii) Double Line-to-Ground fault.	13	K2	CO3
14.	a)	i. Balanced 3-phase voltages 220 V, line-to-line, are applied to a star connected load consisting of three resistors. The neutral of the load is not grounded. The resistance in phase a is 15 ohms, in phase b is 20 ohms and phase c is 35 ohms. Find the symmetrical components.	8	K5	CO4
		ii. A balanced star connected load takes 30 A from a balanced 3-phase 4 wire supply. If the fuses in two lines are removed, find the symmetrical components after the fuses are removed.	5	K5	

(OR)

	b)	Three 6.6 kV, 10 MVA three-phase synchronous generators are connected to common set bus–bars. Each machine has a reactance to positive sequence currents of 20%. The reactances to negative and zero sequence currents are 75% and 30% of the positive sequence value. If single line-to-ground fault occurs on the bus-bar, determine the fault current: i. If all the generator terminals are solidly earthed ii. If only one of the generator neutrals is solidly earthed and the others are isolated; and iii. If one of the generator neutrals is earthed through a resistance of 0.3 Ω and the other are isolated.	13	K5	CO4
15.	a)	Explain step-by-step solution of swing equation in detail.	13	K2	CO5

(OR)

b)	A 3-phase power system consists of a synchronous machine connected through a loss less double circuit transmission to an infinite bus bar. A fault occurs on the transmission line. The maximum power transfer of this system when there is no-fault is 5.0 pu and immediately prior to the instant of the fault, the power transfer is 2.5 pu. The power angle curves during fault and post-fault conditions have peak values of 2.0 pu and 4.0 pu respectively. Determine the permissible increase in the angular displacement between the voltages at the two ends of the system beyond which the circuit breakers could not clear the fault in time for the system to remain in synchronism.	13	K5	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16. a)	i.	For a given 3-bus power system, assume the voltage at bus-1: $V_1 = 1.05 + j\ 0$ pu Voltage at bus-2: $V_2 = 09812 - j\ 0.05226$ pu and Voltage at bus-3: $V_3 = 0.999 - j\ 0.0469$ pu; The line impedances are shown below: Bus-code — Impedance (in pu) 1 - 2 — $0.02 + j\ 0.04$ 1 - 3 — $0.01 + j\ 0.03$ 2 - 3 — $0.0125 + j\ 0.025$ Compute Real and Reactive power loss in all the lines.	8	K4	CO2
	ii.	The line flows (P-jQ) in a power system from bus-1 to bus-2 is (0.9-j0.85) p.u. The line has series impedance of (0.02+j0.1) p.u. and shunt admittance of j0.02 p.u. If voltage of bus-1 is $1.0\angle 0^0$ p.u. Find voltage at bus-2.	7	K4	
		(OR)			
b)	i.	Define Rotor angle stability of a power system. And explain what do you understand by steady state stability, small signal stability and transient stability. Distinguish between stability and stability limit.	8	K4	CO5
	ii.	What are the salient features of Equal Area Criterion (EAC) of stability? Derive the condition for the Stability for the Equal Area Criterion.	7	K2	

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Question Paper Code: 5031

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2023
Fourth Semester
Electrical and Electronics Engineering
U19CS417 – DATA STRUCTURES
(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.	Whether Linked List is linear or Non-linear data structure? Comment on it.	2	K2	CO1
2.	If you are using C language to implement the heterogeneous linked list, what pointer type will you use?	2	K1	CO1
3.	Show the infix expression into its equivalent post fix expression: (A-B)*(D/E).	2	K2	CO2
4.	Identify the minimum number of queues needed to implement the priority queue?	2	K2	CO2
5.	Draw a binary Tree for the expression: A * B - (C + D) * P /.	2	K2	CO3
6.	There are 8, 15, 13, 14 nodes were there in 4 different trees. Which of them could have formed a full binary tree?	2	K1	CO3
7.	Does the minimum spanning tree of a graph give the shortest distance between any 2 specified nodes?	2	K2	CO4
8.	Compare Breadth First Search and Depth First Search.	2	K2	CO4
9.	What is sorting? List some popular sorting methods.	2	K1	CO5
10.	Classify the Hashing Functions based on the various methods by which the key value is found.	2	K2	CO5

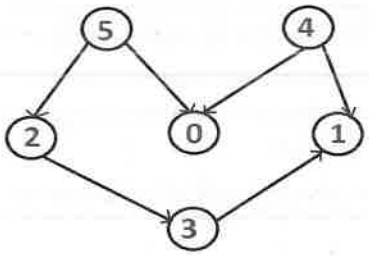
PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Explain the steps involved in insertion and deletion in a doubly linked list.	13	K2	CO1

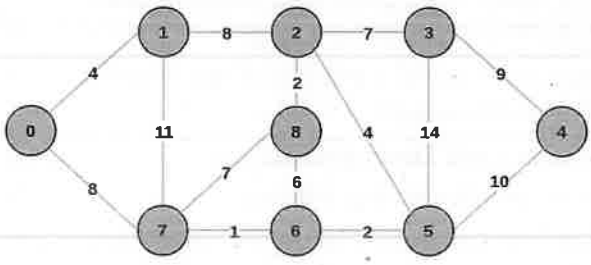
(OR)

	b)	Explain the operation of traversing linked list. Write the algorithm and give an example.	13	K2	CO1
12.	a)	i. Construct an expression tree for the expression (a + b * c) + ((d * e + 1) * g).	6	K3	CO2
		ii. Give the outputs when you apply preorder, in order and post order traversals for the above tree.	7		
		(OR)			
	b)	i. Give brief description about the priority queues.	6	K2	CO2
		ii. Illustrate how to evaluate arithmetic expression using stacks.	7		
13.	a)	Create a binary search tree for the following numbers start from an empty binary search tree. 45,26,10,60,70,30,40 Delete keys 10, 60 and 45 one after the other.	13	K3	CO3
		(OR)			
	b)	Define an AVL tree. Obtain an AVL tree by inserting one integer at a time in the following sequence. 150, 155, 160, 115, 110, 140, 120, 145, 130, 147, 170, 180. Show all the steps.	13	K2	CO3
14.	a)	Explain topological sort algorithm. Trace the algorithm for the following:	13	K2	CO4



(OR)

	b)	Find the minimum spanning tree in the given graph using Prim's algorithm.	13	K2	CO4



Example of a Graph

15. a) Given the input { 4371, 1323, 6173, 4199, 4344, 9679, 1989 } and a hash function of h(X)=X (mod 10) show the result using:

i.	Separate Chaining hash table	7	K2	CO5
ii.	Open addressing hash table using linear probing	6		

(OR)

b)	i.	Sort 20,35,40,100,3,10,15 using insertion sort.	7	K2	CO5
	ii.	Outline the steps involved in merge sort.	6		

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16. a)		Consider five cities: 1. New Delhi 2. Mumbai 3. Chennai 4. Bangalore 5. Kolkata and a list of flights that connect these cities as shown in the following table. Use the given information to construct a graph.	15	K5	CO4

Flight No	Origin	Destination
101	2	3
102	3	2
103	5	3
104	3	4
105	2	5
106	5	2
107	5	1
108	1	4
109	5	4
110	4	5

(OR)

b)	i.	Write an ADT to implement stack of size N using an array. The elements in the stack are to be integers. The operations to be supported are PUSH, POP and DISPLAY. Take into account the exceptions of stack overflow and stack underflow.	8	K3	CO2
	ii.	A circular queue has a size of 5 and has 3 elements 10, 20 and 40 where F = 2 and R = 4. After inserting 50 and 60, what is the value of F and R. Trying to insert 30 at this stage what happens? Delete 2 elements from the queue and insert 70, 80 & 90. Show the sequence of steps with necessary diagrams with the value of F & R.	7		

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Question Paper Code: 8022

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

Fourth Semester

Electrical and Electronics Engineering

U19EE413 – CONTROL 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

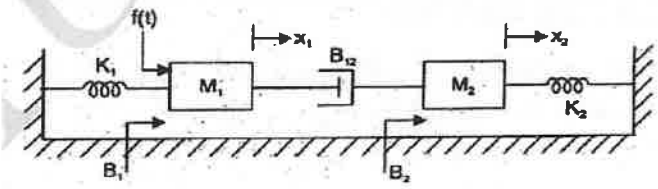
PART – A (10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Define transfer function.	2	K1	CO1
2.	Write Masons Gain formula.	2	K1	CO1
3.	What is time response?	2	K1	CO2
4.	What is transient and steady state response?	2	K1	CO2
5.	Define Phase margin and Gain margin.	2	K1	CO3
6.	Sketch the POLAR plot of G(s) = 1 / (1+st).	2	K2	CO3
7.	Define Phase lag and phase lead.	2	K1	CO4
8.	Define BIBO stability.	2	K1	CO4
9.	State the concept of observability.	2	K1	CO5
10.	What is controllability?	2	K1	CO5

PART – B

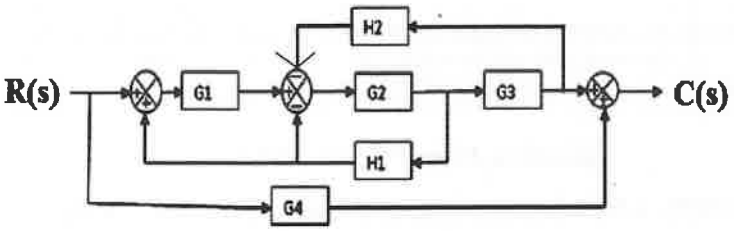
(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	For the given translational mechanical system, write the differential equations and find the transfer function.	13	K3	CO1



(OR)

	b)	Obtain the closed loop transfer function C(S)/R(S) of the system whose block diagram is shown in fig.	13	K3	CO1



12.	a)	Derive expressions for the following time domain specifications of second order under damped system due to unit step input. i. Rise time. ii. Peak time. iii. Delay time. iv. Peak overshoot.	13	K2	CO2
		(OR)			
	b)	i. Evaluate the dynamic error coefficients of the following system G(s) = 10 / S(1+S).	8	K3	CO2
		ii. Explain about dynamic error coefficients.	5	K2	CO2
13.	a)	Given $G(s) = \frac{ke^{-0.2s}}{s(s+2)(s+8)}$. Draw the Bode plot and Calculate K for the following two case: i. Gain margin equal to 6dB and ii. Phase margin equal to 45°.	13	K3	CO3
		(OR)			
	b)	The open loop transfer function of a unity feedback system is G(s) = 1 / S(1+S) (1+2S). Sketch the polar plot and determine the Gain margin and Phase margin.	13	K3	CO3
14.	a)	i. Using Routh criterion determine the stability of the system whose characteristics equation is $S^4 + 8S^3 + 18S^2 + 16S + 5 = 0$.	6	K5	CO4
		ii. $F(S) = S^6 + S^5 - 2S^4 - 3S^3 - 7S^2 - 4S - 4 = 0$. Find the number of roots falling in the RHS plane and LHS plane.	7		
		(OR)			
	b)	Construct Nyquist Plot for a system with the open loop transfer function G(S) H(S) = 5 / S(1-S).Comment on the stability of open loop and closed loop system.	13	K4	CO4
15.	a)	Determine the canonical state model of the system whose transfer function is T(s) $= \frac{2(s+5)}{(s+2)(s+3)(s+4)}$.	13	K2	CO5
		(OR)			

b) Check for controllability and observability of a system having following co-efficient matrices

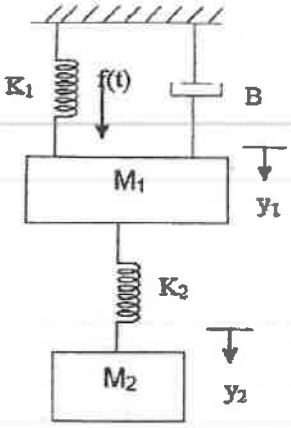
$$A=\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 1\\ -6 & -11 & -6\end{bmatrix}, B=\begin{bmatrix}1\\0\\1\end{bmatrix}, C^T=\begin{bmatrix}10\\5\\1\end{bmatrix}$$

13 K3 CO5

PART – C

(1 x 15 = 15Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Evaluate transfer function y2(s) / f(s).	15	K3	CO1



(OR)

b) Explain in the effect of Lag, lead and lag-lead compensation on frequency response in detail. 15 K2 CO4

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Question Paper Code: 8021

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2023
Fourth Semester
Electrical and Electronics Engineering
U19EE411 – AC MACHINES
(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.	Why are alternators rated in kVA and not in kW?	2	K2	CO1
2.	Define the term voltage regulation of an alternator.	2	K1	CO1
3.	A synchronous motor starts as usual but fails to develop its full torque. What could it be due to?	2	K2	CO2
4.	What are the three methods of determining voltage regulation?	2	K1	CO2
5.	Infer the difference between slip ring rotor and cage rotor of 3 ph induction motor.	2	K2	CO3
6.	Point out the disadvantages, of rotor rheostat control to obtain variable speed of a 3 ph induction motor.	2	K2	CO3
7.	List the different types of speed control of a 3 ph slip ring induction motor.	2	K1	CO4
8.	Write the advantages of slip power recovery scheme.	2	K1	CO4
9.	Give two advantages and two applications of stepper motor.	2	K1	CO5
10.	List the drawbacks of the presence of the backward rotating field in a single phase induction motor.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	Explain the determination of direct (d) and quadrature (q) axis synchronous reactance using slip test.	6	K2	CO1
		ii.	Discuss the parallel operation of two alternators with identical speed/load Characteristics.	7	K2	CO1

(OR)

	b)	i.	A 3300 V, 3phase star connected alternator has a full load current of 100 A. On short circuit a field current of 5 A was necessary to produce full load current. The emf on open circuit for the same excitation was 900 V. The armature resistance was 0.8 Ω/phase. Determine the full load voltage regulation for (1) 0.8 pf lagging (2) 0.8 pf leading.	8	K3	CO1
		ii.	Describe about any one method of determining regulation of an alternator.	5	K2	CO1
12.	a)	i.	Explicate the phasor diagram of a synchronous motor operating at lagging and leading power factor with necessary diagrams.	9	K2	CO2
		ii.	Draw the equivalent circuit of a synchronous motor and analyze the parameters involved in it.	4	K4	CO2
			(OR)			
	b)	i.	A 2000 V, 3 phase, 4 pole, star connected synchronous motor runs at 1500 rpm. The excitation is constant and corresponding to an open circuit voltage of 2000 V. The resistance is negligible in comparison with synchronous reactance of 3.5 Ω /ph. For an armature current of 200 A. Determine a. Power factor b. Power input c. Torque developed.	7	K3	CO2
		ii.	List out the main characteristic features of synchronous motor.	6	K2	CO2
13.	a)		Derive an expression for the torque of a 3 ph induction motor and obtain the condition for maximum torque. Also explain the torque – slip characteristics of the same.	13	K2	CO3
			(OR)			
	b)	i.	A 100 kW, 330 V, 50 Hz, 3 phase, star connected induction motor has a synchronous speed of 500 rpm. The full load slip is 1.8% and full load power factor 0.85. Stator copper loss is 2440 W, iron loss is 3500 W, and rotational losses are 1200 W. Calculate a. rotor copper loss, b. the line current and c. The full load efficiency.	6	K3	CO3
		ii.	Illustrate the different power stages of an induction motor with losses.	7	K2	CO3

14.	a)		With neat diagrams explains the working of any two types of starters used for squirrel cage type 3 phase induction motor.	13	K3	CO4
			(OR)			
	b)	i.	The full load efficiency and power factor of a 12-KW, 440 V, 3 phase induction motor are85% and 0.8 lag respectively. The blocked rotor line current is 45 A at 220 V. Calculate theratio of starting to full-load current, if the motor is provided with a star-delta starter. Neglect magnetizing current.	6	K2	CO4
		ii.	Elucidate the following methods of speed control scheme of a 3 ph IM. a. Cascaded connection. b. Slip power recovery scheme.	7	K2	CO4
15.	a)		List the classification of single phase motors. Explain any two types of single phase induction motors.	13	K2	CO5
			(OR)			
	b)	i.	Develop an equivalent circuit of a single phase induction motor by ignoring core losses.	8	K3	CO5
		ii.	Explain how the single phase induction motor is self-started by using double revolving field theory.	5	K3	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.			Questions	Marks	KL	CO
16.	a)	i.	Consider the 3ph IM parameters as follows: R1 = 1.75 Ω X1 = 5.5 Ω, R'2 = 2.25 Ω, X'2 = 6.6 Ω when the motor is tested on no load it is observed that it takes 3.8 A (line current) and the total core loss is 310 W. By using by approximate equivalent circuit at 4%, slip calculate a. the rotor current, b. supply current and power factor, c. mechanical power developed d. Gross load torque e. Draw the equivalent circuit.	8	K3	CO3
		ii.	Write a brief note on double cage rotor induction motors.	7	K2	CO1
			(OR)			
	b)	i.	Illustrate the working of synchronous motor with different excitations.	7	K3	CO2
		ii.	Expound the methods of starting of synchronous motor against high-torque loads.	8	K2	CO2

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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: 8009

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

Seventh / Fifth Semester

Electrical and Electronics Engineering

U19EEE17 / U19EEV25 – 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.	Identify any three non conventional energy resources in Indian energy sector.	2	K1	CO1
2.	Analyze the impact of renewable energy source in reducing the amount of CO_2.	2	K4	CO1
3.	What do you mean by off shore wind energy system?	2	K1	CO2
4.	Infer the site selection parameters for wind energy systems.	2	K2	CO2
5.	Identify the merits of solar thermal systems.	2	K3	CO3
6.	Distinguish stand alone solar PV system from grid connected solar PV system.	2	K4	CO3
7.	Write any two influencing parameters in battery sizing.	2	K1	CO4
8.	Interpret the applications of power electronic converters in renewable energy systems.	2	K2	CO4
9.	Why the grid connected renewable energy systems are preferred?	2	K1	CO5
10.	Name any two factors that affect the performance of the grid.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a) i.	Analyze the reasons for the global climate change and their impacts.	7	K4	CO1
	ii.	Illustrate any one renewable energy based hybrid system and explain the same.	6	K2	CO1

			(OR)			
	b)		Explain about Indian energy scenario and the action plan for the sustainable energy future.	13	K2	CO1
12.	a)	i.	Explain about any two generator control schemes used in the wind energy conversion system.	7	K2	CO2
		ii.	Compare the vertical axis wind turbine and horizontal axis wind turbine with their performance parameters.	6	K4	CO2
			(OR)			
	b)		Illustrate the wind energy conversion system with all the necessary components and explain the electricity generation by the wind energy.	13	K2	CO2
13.	a)	i.	Explain the principle of solar thermal energy conversion with necessary diagrams.	7	K2	CO3
		ii.	Illustrate the I-V and P-V characteristics of a solar cell and explain the parameters such as: knee point, dark shade, illuminated area.	6	K2	CO3
			(OR)			
	b)		Explain the working of a solar PV system connected to the grid with block diagram. Infer the significance of each block in the diagram.	13	K2	CO3
14.			Infer the significance of power electronic converters in wind energy conversion system. Identify the types of converter systems and analyze their performance characteristics.	13	K2	CO4
			(OR)			
	b)	i.	Identify and explain the influencing parameters in the selection and sizing of battery in the solar PV system.	6	K3	CO4
		ii.	Analyze the design steps involved in designing solar PV array.	7	K3	CO4
15.	a)	i.	What do you mean by fault ride through operation in wind farms and highlight the need of the same.	6	K1	CO5
		ii.	Explain about hybrid system with neat block diagram.	7	K2	CO5
			(OR)			
	b)	i.	How is the interconnection of the solar PV achieved during the disturbances in the power grid?	6	K2	CO5
		ii.	Explain about the impact of harmonics in the grid connected operation of renewable energy system.	7	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Analyze the design steps involved in the standalone operation of the solar PV system and the hybrid operation with wind energy system. Select any one application by your own.	15	K4	CO2, CO3
		(OR)			
	b) i.	Analyze the performance parameters of the DC- DC converters employed in the solar PV system.	8	K4	CO4
	ii.	Identify the significance of yaw control and pitch control in improving the efficiency of the wind turbines.	7	K3	CO2

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: 8002

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 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.	If *g(n)* is a real valued sequence of 2N points and $x_1(n)=g(2n)$ and $x_2(n)=g(2n+1)$, then what is the value of G(k), *k=N,N-1,...2N-1* using FFT?	2	K4	CO1
2.	Given a signal $x[n]=\begin{cases}3(-1)^n & n\geq 0\\ 0 & n<0\end{cases}$ Check if it is an energy signal.	2	K2	CO1
3.	Let the input signal *f (t)* into an ADC be *2t* for *t* greater than zero and less than *4*, and zero otherwise. Let's find the *Z*-transform of this short signal when *T = 1*.	2	K3	CO2
4.	Two sequences x1(n) and x2(n) are related by x2(n) = x1(-n). In the Z-domain find their RoC.	2	K2	CO2
5.	If x(n) is a complex valued sequence given by $x(n)=x_R(n)+jx_I(n)$, then what is the DFT of $x(n)=x_R(n)$?	2	K1	CO3
6.	Calculate DFT of x (n) = {1, 0, 1, 0}.	2	K4	CO3
7.	The response of the FIR filter with impulse response *h(n)={1, 2, 4}* to the input sequence *x(n) = {1, 2}*.	2	K4	CO4
8.	The Peak passband ripple α_p and minimum stopband attenuation α_s of a digital filter are given by 0.1 dB and 35 dB, respectively. Determine their corresponding values δ_p and δ_s in linear terms.	2	K4	CO4
9.	An external memory used with C5X, requires three clock cycles. What is the number of dummy operations carried out by the C5X CPU to avoid pipeline conflict?	2	K2	CO5
10.	List the functional modes of TMS320C processor.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	For a system the impulse response h(t) is given as $h(t)=e^{-t}u(t)+e^{2t}u(-t)$. The system is excited by $x(t)=e^{-2t}u(t)$. Find the output y(t) for this system.	7	K4	CO1
		ii.	The impulse response of a continuous time system is expressed as $$h(t)=\frac{1}{RC}e^{-\frac{t}{RC}}u(t)$$ Find the frequency response and plot the magnitude and phase response.	6		
			(OR)			
	b)	i.	Check whether the following systems are linear and time invariant a) $F[x(n)]=n[x(n)]^2$ b) $F[x(n)]=a\,n[x(n)]^2+bx(n)$	6	K4	CO1
		ii.	Determine the signal energy and signal power for the following complex valued signal and determine the whether it is an energy or a power signal $x(t)=e^{-4t}u(t)$.	7		
12.	a)	i.	Determine the z-transform of the signal *x[n]* given as, $$x[n]=\begin{cases}2^n & n<0\\ \left(\frac{1}{2}\right)^n & n=0,2,4\\ \left(\frac{1}{3}\right)^n & n=1,3,5\end{cases}$$. Determine the z-transform and corresponding ROC.	7	K4	CO2
		ii.	Consider a signal $x[n]=1+\sin\left(\frac{2\pi}{N}\right)n+3\cos\left(\frac{2\pi}{N}\right)n+\cos\left(\frac{4\pi}{N}n+\frac{\pi}{2}\right)$ with a period of *N*. Compute the discrete time Fourier series of the signal *x[n]*.	6		
			(OR)			

	b)	i.	Using long division method, determine the inverse z-transform of the signal; $X(z) = \frac{1}{1-\frac{3}{2}z^{-1}+\frac{1}{2}z^{-2}}$, when a) ROC: |Z|>1 and b) |Z|<1/2.	8	K4	CO2
		ii.	Let us consider two signals $x_1(n) = \{1, 2, 2, 1\}$ and $x_2(n) = \{1, -1, -1, 1\}$. Determine the linear convolution of two sequences using DTFT.	5		
13.	a)		Let us consider two sequences $x[n] = \{0, \hat{2}, -1, 0, c, 1, 0, 0\}$ and $x1[n] = \{0, \hat{2}, 1, 2, -1, 0, 0\}$. Considering that, both sequences are related by $X_1[k] = X[k]e^{j(\frac{2\pi 3k}{5})}$, where *X[k]* is the five point DFT of *x[n]*. Then determine the value of *c*.	13	K4	CO3
			(OR)			
	b)		Determine the decimation in time with radix-2 FFT of sequence *x[n]*, defined by $x[n] = 2^n$, *n* in the range *{0-7}*.	13	K3	CO3
14.	a)	i.	Design the IIR filter using impulse invariance method by transforming the filter having transfer function, $H_a(s) = \frac{16(s+2)}{(s+3)(s^2+2s+5)}$. Assume T = 0.2secs.	7	K2	CO4
		ii.	Design a high pass filter using Hamming window with cut-off frequency of *1.2 rad/sec* and *N = 9*.	6		
			(OR)			
	b)	i.	Using the Bilinear transformation, determine the order *N* and the cut off frequency Ω_c of the analog prototype filter, for the following discrete time design: passband 8 kHz; stopband 9 kHz; passband ripple 0.5 dB; stopband attenuation 40 dB; sampling frequency F_s = 44 kHz.	7	K2	CO4
		ii.	Design a band pass filter to pass frequencies in the range *1* to *2 rad/sec* using Hanning window *N=5*.	6		
15.	a)	i.	Discuss briefly about the addressing modes in TMS320C5X	7	K2	CO5
		ii.	Explain about functional modes of DSP processor.	6		
			(OR)			
	b)		Describe the architecture of TMS320C5X with neat diagram.	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Design a Chebychev filter satisfying the constraints using Bilinear transformation. Assume sampling period of T = 1 Sec. Realize the designed filter with cascade structure $0.707 \le \left\|H(e^{j\omega})\right\| \le 1.0; \quad 0 \le \omega \le 0.2\pi$ $0 \le \left\|H(e^{j\omega})\right\| \le 0.1; \quad 0.5\pi \le \omega \le \pi$	15	K4	CO4
		(OR)			
	b)	An 8-point sequence is given by x(n) = {2, 2, 2, 2, 1, 1, 1, 1}. Determine 8-point DFT by radix-2 DIT-FFT method.	15	K4	CO3

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: 8007

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2023
Fifth Semester
Electrical and Electronics Engineering
U19EE517– POWER SYSTEM PROTECTION AND SWITCHGEAR
(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 surge absorber? How do they differ from surge diverter?	2	K1	CO1
2.	What is meant by primary back up protection of the power system?	2	K2	CO1
3.	What are advantages and disadvantages of static relays?	2	K1	CO2
4.	How protective relays are classified based on their function?	2	K2	CO2
5.	Write about numerical transformer differential protection.	2	K2	CO3
6.	What are the protection methods used for transmission lines?	2	K1	CO3
7.	List out the factors responsible for increase of arc resistance.	2	K1	CO4
8.	What do you mean by current chopping?	2	K1	CO4
9.	An oil circuit breaker is rated as 1500 A, 1000 MVA, 3 second, 3 phase. Find rated making current.	2	K3	CO5
10.	Why oil circuit breakers are not suitable for heavy current interruption at low voltages?	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Explain the need of power system protection and different attributes of protection system.	13	K1	CO1

(OR)

	b)	What are the essential qualities of protective relay? Explain in detail.	13	K2	CO1
12.	a)	With neat diagram, describe the construction and principle of operation of Negative sequence relay.	13	K1	CO2
		(OR)			
	b)	Discuss with relevant connection diagram and phasor diagram, the directional over current relay.	13	K1	CO2
13.	a)	Describe the various method of transformer protection.	13	K2	CO3
		(OR)			
	b)	Explain the construction and working principle of Buchholz relay for transformer protection.	13	K2	CO3
14.	a)	What is resistance switching? Derive an expression for critical resistance in terms of system inductance and capacitance so that no transient oscillations take place in a circuit breaker.	13	K2	CO4
		(OR)			
	b)	Explain the phenomenon of arc in a circuit breaker. What is the need of arc?	13	K1	CO4
15.	a)	Explain with neat sketch the construction, operating principle of bulk oil circuit breakers with its applications and merits.	13	K3	CO5
		(OR)			
	b)	Explain advantages, disadvantages and voltage rating of: i. Air circuit breaker ii. Oil circuit breaker iii. Air blast circuit breaker iv. SF6 circuit breaker v. Vacuum circuit breaker	13	K1	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Explain the following terms w.r.t. the differential protection; spill current, internal fault, through fault, through fault stability limit, through fault stability ratio.	3+3+3 +3+3	K1	CO1
		(OR)			
	b)	What do you mean by over-fluxing or over excitation of transformer? What is the significance of V/f ratio? What is the principle of over-fluxing protection?	5+5+5	K3	CO3

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: 8012

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2023
Fifth Semester
Electrical and Electronics Engineering
U19EEV34 - 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.	Write any two applications of Piezoelectric transducers in biomedical applications.	2	K1	CO1
2.	Differentiate between resting and active potential.	2	K2	CO1
3.	What are Korotkoff sounds?	2	K1	CO2
4.	Name the two factors which regulate pH of human blood.	2	K1	CO2
5.	Sketch the ECG waveform and label its parts.	2	K1	CO3
6.	What are the electrodes used for EMG measurement?	2	K1	CO3
7.	What is MRI scan? List two advantages of MRI.	2	K2	CO4
8.	Explain bio-telemetry with the help of a block diagram.	2	K2	CO4
9.	What are the two most common types of pacemakers implanted?	2	K2	CO5
10.	List any two disadvantages of a defibrillator.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11. a)	i.	Explain the different techniques used for measuring human body temperature.	7	K2	CO1
	ii.	Explain biomechanics of bones and soft tissues.	6		

(OR)

	b)	Define a transducer and identify the selection criteria for biomedical applications. What are the potential applications of ultrasonic and temperature transducers in bio-medical engineering.	13	K2	CO1
12.	a)	i. What is Photo Plethysmography and what are its potential applications?	6	K1	CO2
		ii. Explain the working of a fingertip oximeter.	7		
		(OR)			
	b)	Explain the automatic and semiautomatic methods of measuring blood pressure in detail.	13	K1	CO2
13.	a)	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	K2	
		(OR)			
	b)	Explain in detail the EEG lead system. Name at least six conditions diagnosed by EEG.	13	K2	CO3
14.	a)	Discuss the working principle of endoscopy with neat block diagram. What are the potential applications of endoscopy?	13	K2	CO4
		(OR)			
	b)	What is multi-channel bio-telemetry system? Explain its working with the help of a block diagram.	13	K2	CO4
15.	a)	What is heart-lung machine? Explain with the help of a block diagram.	13	K2	CO5
		(OR)			
	b)	i. Explain about ICCU Patient Monitoring System.	7	K2	CO5
		ii. Infer the working of an AC defibrillator.	6		

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 diagram.	8	K2	CO1
		ii. How the electrical safety is ensured in medical environment. Explain with examples.	7	K2	CO3
		(OR)			
	b)	i. Explain Einthoven triangle and describe how ECG lead configurations are employed.	8	K2	CO3
		ii. Explain the construction and working of ultrasonography.	7	K2	CO4

Reg.No.:												

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

Question Paper Code: 8013

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2023
Fifth Semester
Electrical and Electronics Engineering
U19EEV35 - ROBOTICS AND CONTROL
(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.	State the characteristics of robots.	2	K1	CO1
2.	What is meant by payload capacity of robot?	2	K2	CO1
3.	Define acceleration and velocity.	2	K2	CO2
4.	List the design parameters to be considered for robots.	2	K1	CO2
5.	What are end effectors? Mention its types.	2	K1	CO3
6.	Choose a drive system suitable for heavy load robotic application.	2	K2	CO3
7.	How does optical encoders work?	2	K2	CO4
8.	Differentiate sensor and transducer.	2	K2	CO4
9.	Mention few applications of robots in visual serving.	2	K1	CO5
10.	What are the applications of machine vision system?	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	Explain about various generations of robot.	7	K1	CO1
		ii.	Discuss about Asimov's law of robotics.	6		
			(OR)			
	b)		Explain with neat sketch about functional elements of robotics system.	13	K1	CO1
12.	a)		Illustrate about design models for ground mobile robots.	13	K2	CO2
			(OR)			
	b)		Discuss about design models for mechanic arm.	13	K2	CO2
13.	a)		Classify the type of robotic drives and describe a pneumatic drive system with the functional blocks.	13	K2	CO3
			(OR)			
	b)		Enumerate in detail about mechanical and hydraulic robot grippers.	13	K2	CO3
14.	a)		Discuss about Hill climbing techniques of robot.	13	K2	CO4
			(OR)			
	b)		Using different inputs to an inverse kinematic algorithm, explain the solution of simple inverse kinematic algorithm.	13	K2	CO4
15.	a)		Illustrate machine vision system with a sketch. Give one practical example of its application	13	K3	CO5
			(OR)			
	b)		Analyse how image data is digitized in camera and discuss about the steps involved.	13	K4	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	With neat sketch explain the application and control of robotics in navigation.	15	K3	CO5
		(OR)			
	b)	With neat sketch explain the application machine vision in image processing and analysis.	15	K3	CO5

Reg.No.:												

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

Question Paper Code: 8003

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 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.	Write advantages of Per Unit Quantities.	2	K1	CO1
2.	Write the need of the power system planning.	2	K2	CO1
3.	Mention the advantages & disadvantages of Gauss-Seidal method.	2	K2	CO2
4.	What is Jacobian Matrix in Load Flow analysis?	2	K2	CO2
5.	What is the need of Symmetrical Fault analysis?	2	K2	CO3
6.	State the need of Z_{bus} in symmetrical fault analysis.	2	K2	CO3
7.	Define symmetrical components.	2	K1	CO4
8.	In case of transformer why positive, negative and zero sequence components are considered as same values?	2	K2	CO4
9.	Mention salient features of Equal Area Criterion for stability determination.	2	K2	CO5
10.	What is the use of Swing curve? Draw the Swing curve.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11. a)	i.	Explain the need for planning and operation of power system.	7	K2	CO1
	ii.	Discuss power scenario in India considering Thermal, Hydro, Nuclear power as well as Renewable sources like Solar and Wind.	6		
		(OR)			
b)		The single-line diagram of a three-phase system is shown in Fig.1. Using the common base S_b = 50 MVA, draw the impedance diagram in per unit including the load impedance. The manufacturer's nominal ratings are given as follows:	13	K3	CO1

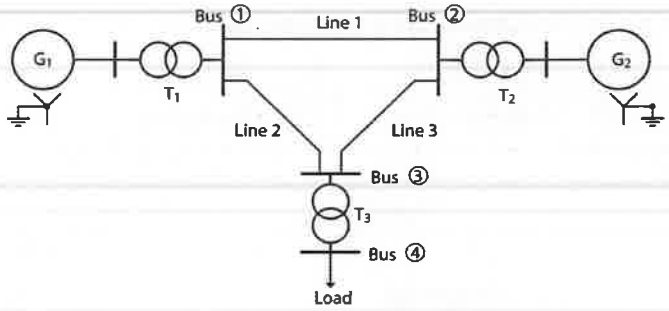

Fig. 1

Device	S_n	$U_{(L-L)n}$	X_n
Generator G_1:	48 MVA	20 kV	20%
Generator G_2:	25 MVA	13.8 kV	15%
Transformer T1:	50 MVA	20/110 kV	8%
Transformer T2:	30 MVA	13.8/110 kV	6%
Transformer T3:	50 MVA	11/110 kV	10%

The three-phase load at bus 4 absorbs 60 MVA at 0.75 power factor (lagging) and lines 1, 2, and 3 have the reactance of 40 Ω, 32 Ω, and 30 Ω, respectively.

Note: S_n = Rating of the device; $U_{(L-L)n}$ = Voltage and X_n = Reactance of the device.

12. a)	i.	Develop Load Flow equation (s) for Gauss-Seidel method. Write limitations of Gauss-Seidel Method of Load flow analysis.	6	K3	CO2
	ii.	Write assumptions in deriving Fast Decoupled Load Flow (FDLF) equations? Write FDLF equations.	7	K1	CO2

(OR)

b) The Fig. shows one-line diagram of a three-bus power system with generators at bus-1 and bus-3. The voltage at bus-1 is $1.05 \angle 0^0$ pu and at bus-3, $|V| = 1.04$ pu. Line impedances are in pu and line charging susceptances are neglected. Obtain state vector using Fast Decoupled Load Flow (FDLF) method. Use two iterations. — 13 K3 CO2

Bus-1 is Slack bus
Bus-2 is PQ bus
Bus-3 is PV-bus

$P_{D2} = 4$ pu and $Q_{D2} = 2$ pu
$P_{G3} = 3$ pu
$0 \leq Q_3 \leq 5$ pu

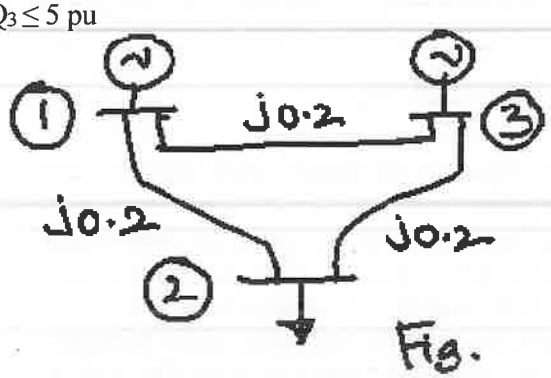

Fig.

13. a) A three-phase fault with a fault impedance of 0.16 pu occurs at bus-3, for which Z_{bus} is given by — 13 K3 CO3

$$Z_{bus} = \begin{bmatrix} j0.016 & j0.08 & j0.12 \\ j0.008 & j0.24 & j0.16 \\ j0.120 & j0.16 & j0.34 \end{bmatrix}$$

Compute the fault current, the bus voltages and the line currents during fault. Assume pre-fault bus voltages 1.0 pu

(OR)

b) i. Mention assumptions made in Short Circuit study. What are their significance? — 6 K1 CO3

ii. Derive the expressions for fault currents and voltages during fault for single line to ground (SLG) fault at p^{th} bus in a power system. — 7 K2 CO3

14. a) Obtain the symmetrical components for the set of unbalanced voltages $V_a = 300 \angle -120^0$, $V_a = 200 \angle 90^0$ and $V_a = 100 \angle -30^0$. — 13 K3 CO4

(OR)

	b)	As Three generators rated 11 kV, 20 MVA has a solidly grounded neutral. Its positive, negative and zero sequence reactances are 60%, 25% and 15% respectively.				
		i.	Calculate the value of reactance that should be placed in generator neutral such that the current for single line to ground fault does not exceed the rated current and	6	K3	CO4
		ii.	What value of resistance in the neutral will serve the same purpose?	7		
15.	a)	i.	Define rotor angle stability? On what basis classification of different stabilities will be done? Explain.	(3+3)	K2	CO5
		ii.	A Transmission line has a total series reactance of 0.2 pu. Reactive power compensation is applied at the middle point of the line and it is controlled such that the midpoint voltage of the transmission line is always maintained at 0.98 pu. If voltage at both ends of the line is maintained at 1.0 pu, then compute the steady state power transfer limit of the line?	7	K3	CO5
			(OR)			
	b)	i.	Explain factors affecting (a) Steady State Stability and (b) Transient Stability.	6	K1	CO5
		ii.	A generator delivers power of 1.0 pu to an infinite bus through a purely reactive network. The maximum power that could be delivered by the generator is 2.0 pu. A three-phase fault occurs at the terminals of the generator which reduces the generator output to zero. The fault is cleared after t_c seconds. The original network is then restored. The maximum swing of the rotor angle is found to be δ_{max} = 110 electrical degrees. Compute, the rotor angle in electrical degrees at $t = t_c$.	7	K4	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.			Questions	Marks	KL	CO
16.	a)		Derive the Jacobian matrix of N-R (polar) method, considering all types of buses. Comment on Jacobian matrix elements.	15	K2	CO2
			(OR)			
	b)	i.	Derive from fundamentals swing equation of an alternator in terms of Inertia Constant (H).	8	K2	CO5
		ii.	A four pole, 60 Hz synchronous generator has a rating of 200 MVA, 08 power factor lagging. The moment of inertia of the rotor is 45,100 kg-m^2. Determine M and H.	7	K4	CO5

Reg.No.:								

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Question Paper Code: 8010

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2023
Seventh Semester
Electrical and Electronics Engineering
U19EEE18 – SPECIAL ELECTRICAL MACHINES
(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.	State the difference between the Electromagnetic torque and Reluctance torque.	2	K2	CO1
2.	Define reluctance & trace the flux path in VR machine and. State the parameters on which reluctance depends on?	2	K3	CO1
3.	From the first principle, derive the expression for the electromagnetic torque of a PM synchronous motor.	2	K3	CO2
4.	Why are damper windings required in PM synchronous motors?	2	K2	CO2
5.	How many distinct positions of the rotor are to be sensed to perform the electronic commutation of a BLDC motor? Why?	2	K2	CO3
6.	What are the sources of torque ripple in a BLDC motor?	2	K2	CO3
7.	Draw the typical Torque – speed characteristics of a switched reluctance motor and name the applications where this motor is preferred.	2	K2	CO4
8.	List the disadvantages of a switched reluctance motor.	2	K2	CO4
9.	Calculate the step angle (mech) of a VR stepper motor having 8 stator poles and 6 rotor poles.	2	K3	CO5
10.	How stepper motors are different from other conventional motors when it comes to position control applications.	2	K3	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)		Show that a set of three-phase balanced currents fed to a set of three phase stator windings with uniform spatial distribution will produce a traveling magnetic field of constant magnitude in the air-gap.	13	K2	CO1
			(OR)			
	b)	i.	What is the principle of toque production in SyRM? What design criteria must be used in rotor design to maximize the Torque developed?	7	K3	CO1
		ii.	Is SyRM self-starting? If not what measures to be incorporated to make the motor self-starting.	6		
12.	a)		Name the three classes of the Permanent Magnets used in electric motors and explain their properties (in II quadrant) with respect to their remanant flux density and coercive force. What kind of operational limits these properties impose on the motor?	13	K2	CO2
			(OR)			
	b)		In a sinusoidal waveform, permanent magnet brushless servomotor phase-to-phase resistance is 8.0 ohms. The phase-to-phase inductance is 16 mH. The voltage constant, which is the ratio of the peak phase voltage induced to the rotational speed, is 25 V / 1000 rpm: p = 2 and n = 10,000 rpm. Calculate the terminal voltage if the load is such that the motor draws 10 A (rms) per phase. Calculate the power factor at operation. Draw the Phasor diagram.	13	K4	CO2
13.	a)	i.	How the rotor position sensing with the help of Hall Effect sensors, is accomplished in a BLDC motor? Clearly indicate the sensor location, status of the three switches while rotor makes one revolution around the stator.	8	K2	CO3
		ii.	How the above information is used by the controller to sequence the currents in the stator windings?	5		
			(OR)			
	b)		Explain the application of PMBLDC motor for motion control systems.	13	K2	CO3
14.	a)	i.	Explain how the name 'Switched reluctance Motor' is given to this motor, from its principle of operation and its construction.	7	K3	CO4
		ii.	With a simple block diagram explain the role of the controller in delivering the required speed profile using a switched reluctance motor.	6	K2	
			(OR)			

	b)	i.	What are the constraints in choosing a pole arc and tooth arc in an SR motor? With neat sketch/graph, derive the conditions to be satisfied by the arc angles that leads to optimum torque (Developed torque/Ampere) production.	8	K2	CO4
		ii.	A three phase six pole SRM has an aligned inductance of 10mH and unaligned inductance of 1mH (Saturation Can be neglected) Find the instantaneous Torque when the rotor is 30^0 before the aligned position, if the phase current is 5A.	5	K3	
15.	a)	i.	Compare Permanent Magnet Stepper Motors against Variable Reluctance Stepper Motors. List down the advantages and disadvantages of these motors.	8	K3	CO5
		ii.	List common and specialized applications of PMSM motors.	5	K2	
			(OR)			
	b)	i.	A stepper motor has 10 stator poles with 4 sub-teeth. The rotor has 50 teeth. Find the step angle and resolution.	6	K3	CO5
		ii.	For a three phase Variable Reluctance motor, give the logic sequence for (i) one phase ON mode (ii) two phase ON mode (iii) half step mode.	7	K2	

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	In general, the constant flux motors are "Velocity Control units". Justify this statement. What are the additional control and sensing elements, needed to make these motors "position control servo units"? Use functional block diagrams to explain the operation.	15	K5	CO3
		(OR)			
	b)	Explain the application of PMSM for railway vehicles.	15	K3	CO2