

Reg. No.

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B.E./ B.TECH.DEGREE EXAMINATIONS, MAY 2023

Second Semester

EE22251 – BASIC ELECTRICAL AND ELECTRONICS ENGINEERING FOR CHEMICAL ENGINEERS
(EEE & Chemical Engineering)
(Regulation2022)

TIME:3 HOURS

MAX. MARKS: 100

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Apply basic electrical laws for the electrical circuits and understand sensors and measurement principles.	3
CO 2	Analyze the characteristics of various semiconductor devices and develop circuits for an application.	4
CO 3	Analyze and select electrical machines for drive applications based on characteristics.	4
CO 4	Identify the structure and types of Electrical drives for specific applications.	3
CO 5	Apply control methods for Electrical Machine and Drives in chemical process industries	3

PART- A(20x2=40Marks)

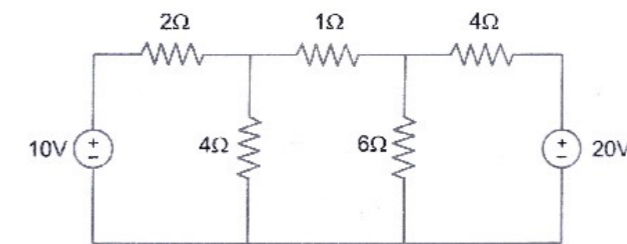
(Answer all Questions)

	CO	RBT LEVEL
1. In a purely resistive electrical appliance, the emf source is 10 V. The current flowing through it is 1 A. If the wires are resistance-free, calculate the resistance of the appliance.	1	3
2. Applying KCL, find i_3 .	1	3
3. A temperature indicator reads 189.8°C when the actual temperature is 195.5°C. Find the percentage error in the reading.	1	3
4. Name the materials commonly used for RTDs. Which one has the most linear characteristics?	1	2
5. What is an ideal diode? Draw its characteristics.	2	2
6. Obtain two transistor analogy of a SCR.	2	4
7. Draw a half-wave rectifier circuit and show the input output waveforms.	2	4
8. What is meant by PWM control in dc chopper?	2	2

9. What is the purpose of yoke in a DC machine?	3	2
10. Write the voltage equation of a DC motor.	3	3
11. What are the types of 3 phase induction motors?	3	2
12. What is the purpose of starters? List the type of starting methods for ac motors.	3	2
13. Draw the block diagram of the basic electrical drive.	4	2
14. List any two factors influencing the choice of electrical drives.	4	3
15. What are the classes of duty?	4	3
16. List any two hazards in petrochemical industries while operating electrical drives.	4	2
17. What are the various conventional speed controls employed for DC motor.	5	2
18. Brief VVVF control and its advantages.	5	3
19. Enumerate the various conventional speed controls employed for AC motor	5	2
20. What do you understand by slip power recovery scheme?	5	4

PART- B (5x 10=50Marks)

	Marks	CO	RBT LEVEL
21. (a) Calculate current through 6Ω resistance using mesh analysis.	(10)	1	3



(OR)

(b) A resistance of 100 Ω, an inductance of 0.2 H and capacitor of 150 μF are connected in series across 230 V, 50 Hz a.c. supply. Calculate the current drawn by the circuit, power factor of the circuit, its nature, power consumed by the circuit. Draw the phasor diagram.	(10)	1	3
22. (a) Explain the static and switching characteristics of MOSFET.	(10)	2	2
(OR)			
(b) Explain construction and working of Full wave rectifier and derive its rectification efficiency.	(10)	2	2
23. (a) Draw a neat sketch of a 3 point starter for DC shunt motor and explain how the motor is protected against overload and loss of supply voltage.	(10)	3	4

(OR)

(b) 'Single phase induction motors are not self-starting' Why? Explain the construction and working principle of single phase capacitor start induction motor. (10) 3 4

24. (a) Explain in detail about the various types of electric drives. (10) 4 3

(OR)

(b) Elaborate industrial hazards & safety measures to be followed. (10) 4 3

25. (a) Draw and explain slip power recovery scheme using static scherbius method. (10) 5 3

(OR)

(b) Explain with block diagram the computer control of DC and AC drives. (10) 5 3

PART- C(1x 10=10Marks)

(Q.No.26 is compulsory)

	Marks	CO	RBT LEVEL
26. In a pharmaceutical industry, a chemical process involves mixing of ingredients by a mixer driven by a DC motor. The drive should be designed such that the machine operates in all four quadrants. Develop a drive control circuit and evaluate its functioning to fulfill the process needs.	(10)	2	4
