Name: **Enrolment No:**	

UPES

End Semester Examination, December 2024

Course: Electrical System Safety & It's Design **Semester : VII**

Program: B. Tech- FSE **Time : 03 hrs.**

Course Code: HSFS4018 **Max. Marks: 100**

Instructions:

SECTION A **(5Qx4M=20Marks)**			
S. No.		**Marks**	**CO**
Q 1	List the types of circuit breaker and brief why SF6 circuit breaker is used for high voltage protection.	**4**	**CO1**
Q 2	Explain working principle of MCB along with its components and substantiate the use of arc chute in MCB.	**4**	**CO1**
Q 3	Enumerate the different substation equipment in sequential order along with their purpose.	**4**	**CO1**
Q 4	What are the limitations of DC motors and substantiate why induction motor is widely accepted by industries.	**4**	**CO2**
Q 5	Explain why Induction Motor is widely used by industries.	**4**	**CO2**
SECTION B **(4Qx10M= 40 Marks)**			
Q 6	Explore the design and implementation of an electrical safety system for a rural agriculture land, illustrating its objectives, challenges, and outcomes.	**10**	**CO2**
Q 7	Examine the key provisions of the Electricity Act 2003, its implementation, and its impact on the Indian electricity industry.	**10**	**CO3**
Q 8	Differentiate the working principle and their use of distance relay and differential relay.	**10**	**CO3**
Q 9	Why is grounding required for electrical safety? Brief the difference between grounding and earthing. Or, Explain the role of relay and circuit breaker in high voltage system.	**10**	**CO3**
SECTION-C **(2Qx20M=40 Marks)**			
Q 10	Tamil Nadu Power Theft and Safety (2015) Overview: Power theft and illegal connections are widespread in India and pose serious electrical safety risks. Tamil Nadu witnessed a series of	**20**	**CO4**

	electrocution deaths in 2015 due to unauthorized tapping of electrical lines. Key Issues: Rampant power theft in rural and semi-urban areas. Lack of proper grounding and safety measures in makeshift electrical connections. Outcome: The Tamil Nadu Electricity Board (TNEB) launched strict measures to curb power theft, installing tamper-proof meters and strengthening enforcement. Public Awareness Campaigns were also initiated to educate communities on the dangers of illegal power connections and the importance of electrical safety. Analyze the relationship between power theft and electrical safety with reference to the 2015 Tamil Nadu power theft incidents. What measures were taken to curb illegal power connections? (Hint: Discuss the hazards posed by illegal connections, the role of TNEB in enforcing safety, and the effectiveness of public education campaigns.) Or, Examine the design and implementation of an electrical safety system in a newly constructed residential building, outlining the objectives, challenges, and outcomes. Describe the use of a transformer in industry along with its working principle. Also substantiates that why transformer coils are submerged in mineral oil with high dielectric strength and the purpose of silica gel for transformer?		
Q 11	Kerala Floods (2018) and Electrical System Failures Overview: During the Kerala floods of 2018, many regions faced severe electrical hazards due to waterlogged substations, short circuits, and electrocution incidents. Key Issues: Electrical substations were not designed to handle high levels of flooding. Electrical infrastructure in low-lying areas did not have adequate protection from water ingress. Outcome: After the floods, Kerala State Electricity Board (KSEB) revised its flood preparedness and electrical safety policies, including raising substations and installing flood protection systems. The incident led to new state-level policies mandating the flood-proofing of essential electrical infrastructure in flood-prone areas across India.	**20**	**CO4**

	How did the 2018 Kerala floods expose vulnerabilities in the state's electrical infrastructure? Discuss the post-flood reforms initiated by the Kerala State Electricity Board (KSEB). (Hint: Focus on the electrical system failures during the floods, the need for flood-proofing, and the new policies implemented to prevent future incidents.)		