Code No: R1941021 **R19** **Set No. 1**

IV B. Tech I Semester Regular Examinations, November – 2022
SWITCHGEAR & PROTECTION
(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
ONE Question from Each unit
All Questions Carry Equal Marks
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UNIT-I

1	a)	Explain the phenomenon of current chopping and its effect on circuit interruption. Why is it more common in an air blast circuit breaker than in oil circuit breaker?	[7]
	b)	What are the ratings and specifications of a circuit breaker?	[8]
		(OR)	
2	a)	Write the operation of an oil circuit breaker with neat diagram also Lists its advantages and disadvantages?	[8]
	b)	Classify circuit breakers. Explain the basic difference between oil circuit breaker and SF6 oil circuit breaker.	[7]

UNIT-II

3	a)	Derive operation characteristics of an impedance and reactance relay. Explain how you provide direction features to these relays?	[8]
	b)	With the help of a neat sketch the working of a balanced beam type relay?	[7]
		(OR)	
4		Compare the R-X characteristics of (i) impedance relay (ii) mho relay and (iii) reactance relay.Also give their applications?	[15]

UNIT-III

5		Explain the protection of a generator against (i)loss of excitation (ii)stator inter turn fault and(iii) over speeding.	[15]
		(OR)	
6	a)	Explain with a neat circuit diagram the differential protection scheme used to protect star-delta transformers.	[7]
	b)	A three phase transformer of 220/11000 line volts is connected in star/delta. The protective transformers on 220V side have a current ratio of 600/5. What should be ratio of current transformers on 11000V side? Draw the circuit also?	[8]

UNIT-IV

7	a)	Explain the three zone distance relay using impedance relays.	[7]
	b)	Describe the Translay protection scheme for feeder with neat diagram.	[8]

(OR)

8	a)	What is the importance of bus-bar protection? What are the requirements of protectionof lines?	[7]
	b)	Draw and explain the differential protection of bus bars.	[8]

UNIT-V

9	a)	Explain the need of static relays protection? Mention its merits.	[7]
	b)	Describe the realization of Static MHO relay and static reactance relays.	[8]

(OR)

10	a)	What are the different types of grounding? Explain the reactance grounding?	[7]
	b)	Discuss the causes of over voltages in a power system.	[8]

Code No: R1941021 **R19** **Set No. 2**

IV B. Tech I Semester Regular Examinations, November – 2022
SWITCHGEAR & PROTECTION
(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
ONE Question from Each unit
All Questions Carry Equal Marks
*****

UNIT-I

1	a)	Explain the features of an air-blast circuit breaker by means of simple sketches.	[7]
	b)	Describe with a neat sketch the principle of operation of a oil circuit breaker.	[8]
		(OR)	
2	a)	What is resistance switching and derive the expression for the value of resistance to beinserted to reduce RRRV.	[7]
	b)	Explain the working of a SF6 circuit breaker.	[8]

UNIT-II

3	a)	What is an impedance relay? Discuss its principle of operation. Show its characteristics on R-X diagram. What are the merit of this relay?	[8]
	b)	Derive the equation for the torque developed in an induction relay?	[7]
		(OR)	
4	a)	What are the various types of over current relays? Discuss their area of applications.	[7]
	b)	Discuss in detail about the fundamental requirements of a protective relay?	[8]

UNIT-III

5	a)	Explain with the help of line diagram the connections and functioning of differential relay for generator protection.	[7]
	b)	Discuss with a neat diagram the application of Merz-Price circulating principle for the protection of alternator	[8]
		(OR)	
6	a)	Explain the protective scheme for the transformer that takes care of magnetizing inrush current without affecting the sensitivity.	[7]
	b)	A 3-phase transformer rated for 33/6.6 KV is star/delta connected and the protection current transformers on the low voltage side have a ratio of 400/5A.Determine the ratios of CT's on the HV side.	[8]

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UNIT-IV

7		Explain over-current protection of feeders. How is the protection system graded with respect to the time of operation of relays for a radial feeder?	[15]
		(OR)	
8	a)	Discuss the operation of differential protection of bus bars with diagram?	[8]
	b)	Describe the carrier current protection scheme with neat diagram?	[7]

UNIT-V

9	a)	What are the advantages and disadvantages of microprocessor based digital relay with other relays.	[7]
	b)	Explain directional over current static relays with neat block diagram.	[8]
		(OR)	
10	a)	Discuss the internal and external causes of over voltages in a power system.	[7]
	b)	Describe the construction, principle of operation and application of valve type lightning arrester?	[8]

Code No: R1941021 **R19** **Set No. 3**

IV B. Tech I Semester Regular Examinations, November – 2022
SWITCHGEAR & PROTECTION
(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
ONE Question from Each unit
All Questions Carry Equal Marks
*****

UNIT-I

1	a)	List the properties of SF6 gas and explain how it is used in circuit breakers.	[7]
	b)	Explain the reason for initiation of electric arc during contact separation.	[8]
		(OR)	
2	a)	Explain in detail about Air blast circuit breaker with a neat circuit diagram.	[7]
	b)	Discuss the rate of rise of restricking voltage and explain its importance in arc extinction.	[8]

UNIT-II

3	a)	Explain with a neat sketch the operation of an induction type over current relay.	[7]
	b)	Derive the operating conditions of various types of distance relays. Discuss operating characteristics of these relays.	[8]
		(OR)	
4	a)	What is mean by percentage bias? How is this achieved in a practice in a differential relay? Under what circumstances is a percentage differential relay preferred over the differential relay?	[7]
	b)	Discuss in detail about the fundamental requirements of a protective relay?	[8]

UNIT-III

5	a)	With suitable diagram, describe the application of the Mertz-Price circulating current system to protect the alternator. What precautions must be taken in installing this system?	[7]
	b)	Explain split-phase relaying protection of a 3- phase alternator with relevant diagrams?	[8]
		(OR)	
6	a)	A 3-ϕ, star- delta 11/6.6 KV transformer is protected by means of differential protection system. The 6.6KV delta connected side has CT ratio 600/5. Calculate CT ratio on HT side.	[7]
	b)	Explain in detail about Bucholtz relay with a neat sketch.	[8]

Code No: R1941021 **R19** **Set No. 3**

UNIT-IV

7	a)	Explain about the current graded system of protection and its disadvantages?	[7]
	b)	Draw and explain the circuit for the protection of parallel feeders?	[8]

(OR)

8		Describe the following system of bus bar protection: i) Differential protection Land ii) Faults bus protection.	[15]

UNIT-V

9	a)	Write the advantages and disadvantages of static relays?	[7]
	b)	Draw and explain the block diagram approach of numerical relays.	[8]

(OR)

10	a)	What are the various types of lighting arresters? Explain, with a neat sketch, the working of Zinc oxide lightning arrester.	[8]
	b)	What are the methods of neutral grounding? Discuss the arcing grounding system with neat diagram?	[7]

Code No: R1941021 **R19** **Set No. 4**

IV B. Tech I Semester Regular Examinations, November – 2022
SWITCHGEAR & PROTECTION
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Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
ONE Question from Each unit
All Questions Carry Equal Marks
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UNIT-I

1	a)	Describe with the aid of neat sketch the working of a air blast circuit breaker.	[8]
	b)	What is meant by circuit breaker? Discuss the phenomenon of arc formation in a CB.	[7]
		(OR)	
2	a)	Explain the construction and working of vacuum circuit breaker.	[10]
	b)	Discuss the concept of auto reclosing.	[5]

UNIT-II

3	a)	What are the functions of current and time multiplier settings associated with induction type over current relay?	[7]
	b)	With a neat diagram explain the working of induction type directional over current relay?	[8]
		(OR)	
4	a)	Explain the distance relay protection scheme.	[10]
	b)	Explain the expression the Universal torque equation.	[5]

UNIT-III

5	a)	What are various faults that occur in the rotor of an alternator and how the rotor is tobe protected from these faults?	[7]
	b)	Discuss suitable protection schemes which are used for i) rotor earth fault ii) Rotor open-circuit of synchronous generator.	[8]
		(OR)	
6	a)	With aid of neat schematic diagram describe the percentage differential protection scheme ofa transformer.	[9]
	b)	What are the various types of transformer faults? List out the various protection schemes available for transformers.	[6]

Code No: R1941021 **R19** **Set No. 4**

UNIT-IV

7	a)	Describe the three zone distance relay protection of the line using impedance relays.	[8]
	b)	Draw and explain the time verses PSM curve with an example?	[7]

(OR)

8	a)	Draw and explain the differential protection of bus bars.	[7]
	b)	Discuss in detail about the fault bus protection with using circuit diagram?	[8]

UNIT-V

9	a)	Discuss the operation of static instantaneous over current relay with circuit diagram?	[7]
	b)	Describe the operation of static distance relay with neat diagram?	[8]

(OR)

10	a)	What is lightening? Describe the mechanism of lighting discharge by drawing suitable diagrams	[7]
	b)	Explain the differences between equipment grounding and system grounding?	[8]