Code No: RT32022 **R13** SET - 1

III B. Tech II Semester Regular/Supplementary Examinations, April - 2017

SWITCHGEAR AND PROTECTION

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	Name and state briefly two theories of reducing of arc in a circuit breaker.	[4M]
	b)	Draw the diagram of induction disc relay.	[4M]
	c)	What are the common types of generator faults?	[3M]
	d)	What is the purpose of time grading of protection system and where is it employed?	[4M]
	e)	What is meant by a comparator?	[3M]
	f)	What are the internal causes of over voltages? What is meant by voltage surge?	[4M]

PART -B

2		Discuss the principle of arc interruption in an i)oil circuit breaker and ii)air blast circuit breaker	[16M]
3		What is Universal torque equation? Using this equation derive the following characteristics. i)impedance relay ii)reactance relay iii)mho relay .Draw the characteristics and indicate clearly the Zones of operation and no-operation.	[16M]
4		Explain the protection of a generator against (i)loss of excitation (ii)stator inter turn fault and(iii) over speeding.	[16M]
5		Explain the directional comparison method of carrier current protection.	[16M]
6	a)	With the help of neat diagram explain the principle of static distance relay.	[8M]
	b)	Discuss the advantages of digital relays. Describe the basic functional blocks of a microprocessor based digital relay.	[8M]
7	a)	With a neat diagram explain the operation of any one type of lightning arrester.	[8M]
	b)	Discuss the basic ideas of insulation coordination in the practical power system.	[8M]

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Code No: RT32022 **R13** SET - 2

III B. Tech II Semester Regular/Supplementary Examinations, April - 2017

SWITCHGEAR AND PROTECTION

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

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2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	What is meant by a circuit breaker? Explain its function?	[4M]
	b)	Give the various types of over current relays and give their approximate characteristics	[4M]
	c)	What is meant by differential protection?	[4M]
	d)	What are the main elements of current-carrier protection?	[4M]
	e)	What is the main difference between a phase comparator and amplitude comparator?	[3M]
	f)	What is meant by lightning?	[3M]

PART -B

2		What are the advantages and problems associated with the use of SF_6 in a circuit breaker? Describe the construction and working of an SF_6 circuit breaker with multiple breaks.	[16M]
3	a)	With a neat diagram explain the working of induction type directional over current relay?	[10M]
	b)	What are the various types of over current relays? Discuss their area of applications.	[6M]
4	a)	Discuss suitable protection schemes which are used for i) rotor earth fault ii) Rotor open-circuit of synchronous generator.	[10M]
	b)	A 3-phase transformer rated for 33/6.6KV 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.	[6M]
5	a)	Explain the Translay scheme of protection for feeders.	[8M]
	b)	Discuss and compare briefly various bus-bar arrangements in a power system.	[8M]
6	a)	Discuss the instantaneous static over current relay.	[8M]
	b)	Discuss in detail about the phase comparators.	[8M]
7	a)	What are the basic requirements of an earthing system.	[8M]
	b)	What are the causes of short circuit due to failure of insulation on overhead conductors?	[8M]

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Code No: RT32022 **R13** SET - 3

III B. Tech II Semester Regular/Supplementary Examinations, April - 2017

SWITCHGEAR AND PROTECTION

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	Explain the various methods of arc extinction in a circuit breaker.	[4M]
	b)	What are the advantages of induction cup relay over induction disc relay?	[4M]
	c)	What are the different types of faults and abnormal conditions expected in an alternator?	[3M]
	d)	What is the necessity of bus bar protection? How the bus-bar protection scheme is stabilized?	[4M]
	e)	What is the principle of static relays?	[4M]
	f)	Why earth wire is provided in overhead transmission lines?	[3M]

PART -B

2	a)	Describe with a neat sketch the principle of operation of a oil circuit breaker.	[8M]
	b)	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?	[8M]
3		Compare the R-X characteristics of (i) impedance relay (ii) mho relay (iii) reactance relay. Also give their applications?	[16M]
4	a)	With aid of neat schematic diagram describe the percentage differential protection scheme of a transformer.	[8M]
	b)	With a neat sketch explain the Merz-Price circulating current scheme for protection of alternators.	[8M]
5		Explain in detail carrier-current protection scheme. Describe carrier phase comparison relay with neat diagram.	[16M]
6	a)	With the help of neat diagram explain the principle of static differential relay.	[10M]
	b)	Explain clearly how a phase comparator is used in the protective relay.	[6M]
7		Discuss and compare the various methods of neutral earthing explain.	[16M]

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Code No: RT32022 **R13** SET - 4

III B. Tech II Semester Regular/Supplementary Examinations, April - 2017
SWITCHGEAR AND PROTECTION
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	Discuss the reasons for arc formation in circuit breakers and enlist the methods of arc extinction?	[4M]
	b)	Describe the Advantages and working of buchholz relay.	[4M]
	c)	Discuss the different transformer faults. What are the various protection schemes available for transformer?	[4M]
	d)	Discuss the advantages of three zone protection scheme.	[3M]
	e)	What are the merits and demerits of static relay over electro-magnet relay?	[4M]
	f)	What are the advantages of neutral grounding?	[3M]

PART -B

2	a)	Classify circuit breakers. Explain the basic difference between oil circuit breaker and SF6 oil circuit breaker.	[8M]
	b)	Explain the features of an air-blast circuit breaker by means of simple sketches.	[8M]
3	a)	Explain the distance relay protection scheme.	[10M]
	b)	An IDMT type over current relay is used to protect a feeder through 500/1A CT. The relay has a PlugSetting of 125% and TMS=0.3.Find the time of operation of the said relay if a fault current of 5000A flows through the feeder. Make use of the following characteristics	[6M]

PSM	2	3	5	8	10	15
Time for unity TMS (100% current=1A)	10	6	4.5	3.2	3	2.5

4		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?	[16M]
5		Briefly explain the following (i)Static distance relay (ii)Basic components of static relay	[16M]
6		Explain with a neat circuit diagram the differential protection scheme used to protect star-delta transformers. Describe with a sketch the operation of buchholz relay.	
7	a)	Enumerate the basic concepts of insulation coordination.	[8M]
	b)	Briefly explain the various methods of overvoltage protection of overhead transmission line.	[8M]

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