BACHELOR OF ENGINEERING (ELECTRICAL ENGINEERING) FOURTH YEAR SECOND SEMESTER EXAM 2019
SUBJECT: - POWER SYSTEM PROTECTION & SWITCHGEAR

Time: Three hours

Full Marks: 100
(**50 marks for this part**)

Use a separate Answer-Script for each part

No. of Questions		PART -I **Answer any Three** (Two marks reserved for well organized answers)	Marks
1)	a)	Explain why the 'contact wipe' feature is included in a circuit breaker.	(6)
	b)	Briefly discuss the Auto Reclosing feature of Circuit Breakers.	(10)
2)	a)	State the opposing forces which the circuit breakers have to overcome during closing operation. In this regard also define making time, opening speed and closing speed.	(2+6 =8)
	b)	A circuit breaker has a critical arc length of 18cm and its speed of contact separation is 6m/sec. If the voltage drop per cm. of arc length is 650 volts, when interrupting 15kA, calculate the arc energy liberated in KW-s. Also state the difference between arc, spark and glow discharge.	(5+3 = 8)
3)	a)	Consider a system under sudden short circuit. In this regard explain, with relevant diagrams, the two conditions which determine the behaviour of the current.	(8)
	b)	Briefly explain Active recovery Voltage & deduce its expression. What is the significance of RRRV in circuit breakers?	(8)
4)	a)	Discuss the problems associated with interruption of small capacitive currents and how such currents are interrupted by circuit breakers.	(8)
	b)	Specify in details, the rating of a typical circuit breaker.	(8)
5)		Attempt **any two** questions from the following: (i) With necessary derivation show how to connect the sequence networks to stimulate L-G fault. (ii) Explain the current interruption phenomenon in a SF$_6$ circuit breaker. (iii) Explain the desirable properties of the contact materials to be used in vacuum circuit breakers. (iv) What are the advantages and disadvantages of Oil Circuit Breakers?	(8×2 =16)

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BACHELOR OF ELECTRICAL ENGINEERING
(EVENING)EXAMINATION, 2019

(4TH Year, 2nd Semester)

POWER SYSTEM PROTECTION &SWITCHGEAR

PART-II

Answer any 3 questions

(2 marks reserved for neatness)

Q1.(a)Draw typical three phase induction motor protection schemes on a single diagram. 10 marks

(b)Explain carrier transfer distance protection scheme for transmission lines. 6 marks

Q2.(a) Explain in details the operation of an induction type directional overcurrent relay. 8 marks

(b) Explain restricted earth fault protection of Dyn 11 transformers. 8 marks

Q3. (a)Draw a schematic diagram of a solid state distance relay. 6 marks

(b)Derive the Universal Relay torque equation. 10 marks

Q4. (a)What are the disadvantages of plain impedance relays?How are they overcome? 6 marks

(b)Explain in details the realization of a Reactance relay. 10 marks

Q5. (a)Draw the functional block diagram of a digital relay. 6 marks

(b)A star connected 3 phase, 10MVA, 6.6KV alternator has a per phase reactance of 10%.It is protected by the Merz price circulating current principle which is set to operate for fault currents not less than 175 A.Calculate the value of the earthing resistance to be provided in order to ensure that only 10% of the alternator winding remains unprotected. 10 marks

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