QPC: RD20BTECH347 AR 20 Reg. No | | | | | | | | | | |

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Fifth Semester – Regular) Examinations, December – 2022

BPCEL5040 / BPCEE5040 – Switchgear and Protection

(EE & EEE)

Time: 3 hrs Maximum: 70 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) **(1 x 10 = 10 Marks)**

Q.1. Answer ***ALL*** questions [CO#] [PO#]

a. The power factor of the arc in a circuit breaker is CO1 PO1

(i) Zero leading (ii) Zero lagging

(iii) Unity (iv) Any value from zero to unity

b. An ideal circuit breaker should offer CO1 PO1

(i) Zero & infinite impedance before & after interruption respectively (ii) Infinity & zero impedance before & after interruption respectively

(iii) Equal impedance before & after interruption (iv) None of these

c. What is the main purpose of oil in oil circuit breakers? CO1 PO2

(i) Provide insulation (ii) Quenching arc

(iii) Provide cooling of contacts (iv) None of the above

d. Which of the following circuit breakers is used for the railway electrification? CO1 PO1

(i) Air blast circuit breaker (ii) SF_6 circuit breaker

(iii) Bulk oil circuit breaker (iv) Minimum oil circuit breaker

e. Plug setting of a electromagnetic relay can be altered by varying CO2 PO2

(i) Number of ampere turns (ii) Air gap of magnetic path

(iii) Adjustable back stop (iv) None of these

f. For phase fault on long line, which relay is used? CO2 PO1

(i) MHO relays (ii) Reactance relays

(iii) Impedance relays (iv) All of these

g. Instantaneous relay is CO2 PO1

(i) Hinged armature type (ii) Polarized type

(iii) Balanced beam type (iv) All of these

h. Which Type of protection is provided on a generator to protect against stator insulation failure? CO3 PO2

(i) Differential protection (ii) Overcurrent relay

(iii) Thermocouple actuated alarm (iv) Reverse power relay

i. Percentage differential protection in a transformer is recommended to prevent mal-operation due to CO3 PO2

(i) External fault currents (ii) Internal fault currents

(iii) Magnetizing currents (iv) None of the above

j. Which relay is used for protection of feeders? CO3 PO1

(i) MHO relay (ii) Translay relay

(iii) Merz price protection (iv) Buchhloz relay

PART – B: (Short Answer Questions) **(2 x 10 = 20 Marks)**

Q.2. Answer ***ALL*** questions [CO#] [PO#]

a. Mention the factors on which arc resistance depends. CO1 PO1

b.	Define recovery voltage and restriking voltage.	CO1	PO1
c.	What are the advantages of air blast circuit breaker?	CO1	PO1
d.	Define the term "Pick up" value in a protective relay.	CO2	PO1
e.	Discuss about IDMT Relay.	CO2	PO2
f.	Classify the types of differential relay	CO2	PO1
g.	State the methods of protection of busbar.	CO3	PO1
h.	Explain why the secondary of current transformer should not open?	CO3	PO2
i.	What is the necessity of earthing?	CO4	PO1
j.	Explain types of over voltages in power systems?	CO4	PO2

PART – C: (Long Answer Questions) **(10 x 4 = 40 Marks)**

Answer ***ALL*** questions

		Marks	[CO#]	[PO#]
3. a.	Explain the phenomenon of current chopping in a circuit breaker. What measures are taken to reduce it?	4	CO1	PO1
b.	Describe the construction, operating principle and application of SF6 circuit breaker with a neat sketch. Also discuss its advantages over other types of circuit breakers.	6	CO1	PO2
	(OR)			
c.	With neat diagram explain the construction and principle of operation of air blast circuit breaker.	5	CO1	PO1
d.	For a 132Kv system, the reactance and capacitance up to the location of Circuit breaker is 3 ohms and 0.015μF, respectively. Calculate the i.)The frequency of transient oscillation. ii.) The maximum value of restriking voltage cross the contacts of the Circuit breaker. iii.) The maximum value of RRRV.	5	CO1	PO2
4. a.	With neat diagram explain the principle of operation of an Induction disc type Over Current relay.	5	CO2	PO1
b.	Explain balanced beam type relay. Also mention application of electromagnetic relay.	5	CO2	PO1
	(OR)			
c.	Explain current differential relay.	6	CO2	PO1
d.	Distinguish between Static relay and Electromagnetic relay?	4	CO2	PO1
5. a.	Describe with neat sketch, protection against stator fault by percentage differential relay.	5	CO3	PO2
b.	What are the faults occur in a transformer. Explain Incipient fault and reasons for occurrence of these faults.	5	CO3	PO1
	(OR)			
c.	A 3-phase, 12MVA, 6.6KV star connected alternator has a per phase reactance of 12%. It is protected by Merz-Price circulating current principle which is set to operate for fault current not less than 180A. Calculate the value of earthing resistance to be provided in order to ensure that only 12% of the alternator winding remains unprotected.	10	CO3	PO2
6. a.	With a neat block diagram, explain the operating principle of Peterson coil.	5	CO4	PO1
b.	Discuss the basic ideas of insulation coordination in the practical power system.	5	CO4	PO2
	(OR)			
c.	With a neat diagram explain the operation of any one type of lightning arrester.	5	CO4	PO2
d.	What is earthing of neutral? Why is it done? Briefly discuss any one method of neutral earthing.	5	CO4	PO2

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