Hall Ticket Number:

Code No. : 16312

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (E.E.E.: CBCS) VI-Semester Main Examinations, January-2021

Switchgear and Protection

Time: **2** hours Max. Marks: **60**

*Note: Answer any **NINE** questions in **Part-A** and any **THREE** from **Part-B***

Part-A (9 × 2 = 18 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Compare between an earth fault and phase fault over current relays interms of PSM setting. Justify the answer?	2	2	1	1,2
2.	What is time multiplier setting in a relay? Why this is necessary?	2	1	1	1,2
3.	What is meant by under reach in connection with a distance protection?	2	1	2	1,2
4.	Draw the block diagram of static definite time overcurrent relay.	2	1	2	1,2
5.	Which type of relay is preferred to protect an Alternator against loss of excitation?	2	1	3	1,2
6.	A transformer is connected Y/Δ how the CTs are connected on primary and secondary side for differential protection?	2	2	3	1,2
7.	What is Resistance switching in circuit breakers?	2	1	4	1,2
8.	Define recovery voltage of a circuit breaker?	2	1	4	1,2
9.	Define Protective zone in connection with a ground wire.	2	1	5	1,2
10.	What is meant by Insulation Coordination?	2	2	5	1,2
11.	Define Pickup and Reset values of an overcurrent relay?	2	1	1	1,2
12.	Which type of distance relay is inherently directional relay? Justify the answer?	2	1	2	1,2
	Part-B (3 × 14 = 42 Marks)				
13. a)	Explain the principle of operation of a Directional relay with VI characteristics and necessary equation?	8	2	1	1,2
b)	Determine the time operation of a 5 A, 3 sec, over current relay having a current setting of 150% and a time multiplier setting of 0.6 connected to a supply through a C.T. ratio of 400/5, when a fault current of 4800A flows in the primary of CT.(Assume that the relay calibration curve gives a time of 3.2s for 8 times full load current).	6	3	1	1,2
14. a)	Analyze how a phase comparator can be used for amplitude comparison with the help of a neat phasor diagram.	7	4	2	1,2
b)	Explain the applications of Various distance relays?	7	2	2	1,2

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15. a)	With a neat diagram describe a protection scheme which restrains the operation of a relay during the magnetizing inrush current of a Transformer?	7	4	3	1,2
b)	A 13.8 kV 125MVA star connected alternator has a synchronous resistance of 1.4 pu/ph, and negligible resistance. It is protected by Merz price protection scheme which operates when out of balance current exceeds 10% of full load current. If the neutral is earthed through a resistance of 2ohms, calculate, what portion of the winding is protected against earth fault?	7	4	3	1,2
16. a)	With the help of neat sketch explain the construction and the working operation of SF_6 circuit breaker?	8	2	4	1,2
b)	A three phase alternator has the line voltage of 11kv.The generator is connected to a circuit breaker. The inductive reactance up to the circuit breaker is 5 ohms per phase and the capacitance up to circuit breaker between phase and neutral is 0.01μF. Calculate the following : a) Peak restriking voltage across the Circuit Breaker. b) Frequency of restriking voltage transient. c) Maximum Rate of Rise of Restriking Voltage (R.R.R.V.)	6	4	4	1,2
17. a)	With the help of neat sketch, Explain the working of Expulsion type lightning arrester?	7	2	5	1,2
b)	Explain the methods to reduce the tower-footing resistance?	7	2	5	1,2
18. a)	Derive universal relay torque equation?	6	1	1	1,2
b)	Draw the block diagram of Numerical relay and illustrate the advantages of numerical relay over static relay.	8	3	2	1,2,5
19.	Answer any ***two*** of the following:				
a)	Explain the restricted earth fault protection for an alternator stator winding?	7	2	3	1,2
b)	Explain the concept of Current chopping?	7	2	4	1,2
c)	Explain the significance of Peterson coil with the necessary derivation?	7	2	5	1,2

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	66.40
2	Knowledge on application and analysis (Level-3 & 4)	33.60
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	---

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