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B.Tech DEGREE EXAMINATION, DECEMBER 2023

Sixth Semester

18EEC305T - POWER SYSTEM PROTECTION

(For the candidates admitted during the academic year 2020 - 2021 & 2021 - 2022)

Note:

i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

ii. **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours **Max. Marks: 100**

PART - A (20 × 1 = 20 Marks)

Answer **all** Questions

		Marks	BL	CO
1.	Plug setting multiplier is the (A) Ratio of pick-up current to the fault current in relay coil (B) Ratio of fault current in relay coil to the rated secondary current of CT (C) Ratio of rated secondary current of CT and current setting (D) Ratio of fault current in relay coil to the pick-up current	1	1	1
2.	The most frequently occurred fault on the overhead transmission line is (A) Line to line fault (B) Three-phase fault (C) Double line to ground fault (D) Single line to ground fault	1	1	1
3.	The relay coil is attracted to close the trip circuit at the minimum current is called (A) Breaking current (B) Off-set current (C) Relay current (D) Pickup current	1	1	1
4.	A relay can function even when a fault point is beyond its protected length is called (A) Over reach (B) Under reach (C) Reach (D) Unreach	1	1	2
5.	Which type of relay in the transmission line is having the property of being inherently directional? (A) Impedance relay (B) Mho relay (C) Ohm relay (D) Reactance relay	1	1	2
6.	The torque produced in the induction relays will be maximum, if the angles between two fluxes are (A) 0° (B) 30° (C) 90° (D) 45°	1	2	2
7.	An inverse time relay is one in which the operating time is (A) Proportional to the pickup current (B) Inversely proportional to the inverse current (C) Proportional to the actuating quantity (D) Inversely proportional to the magnitude of the actuating quantity	1	1	2
8.	The electromagnetic relays plug settling can be adjusted by (A) Number of amperes turns (B) Spring action (C) Air gap of magnetic path (D) Adjustable back stop	1	2	2
9.	The current setting of an overcurrent relay is 12.5% and it is connected to a supply circuit through a CT of ratio 400/5. The pick-up value is (A) 10 A (B) 12.5 A (C) 15 A (D) 0.625 A	1	2	3

10.	Back-up protection is used for the purpose (A) To decrease the cost (B) To leave no blind spot (C) To increase the speed of protection (D) To guard against failure of the primary	1	1	3
11.	In transformer protection, the maximum allowable temperature during overheating is ---------- degrees. (A) 102 (B) 78 (C) 95 (D) 63	1	1	3
12.	The main causes of over speed in an alternator is (A) Low power factor (B) Sudden loss of load (C) High winding temperature (D) Low winding temperature	1	2	3
13.	In order to compatible with the analog interface, _____ is necessary to make the signals from the transducers. (A) Signal conditioner (B) Aliasing (C) Sampling (D) Filtering	1	1	4
14.	The relay compares _____ component of current with pick up setting to make trip decision. (A) harmonic (B) fundamental frequency (C) filtering (D) imaginary	1	1	4
15.	An optical information signal enters at the transmitter end of the fiber optic communication system is delivered to the receiver end by the_____ (A) optical regènerator (B) optical fiber (C) relaying (D) FPGA	1	1	4
16.	In microprocessor-based relays, the microcomputer reads the current signal and then compares it with the (A) Relay time (B) Delay time (C) Time delay (D) Pick-up value	1	1	4
17.	The switching, control and protective action in an electric circuit is controlled by (A) fuse (B) circuit breaker (C) switchgear (D) relay	1	1	5
18.	Fuses can serve upto a current of (A) 25 A (B) 50 A (C) 75 A (D) 100 A	1	1	5
19.	The acting contacts for a circuit breaker are made of (A) Stainless steel (B) Hard pressed carbon (C) Porcelain (D) Copper tungsten alloy	1	1	5
20.	The number of cycles in which a high speed circuit breaker can complete its operation is (A) 3 to 8 (B) 10 to 18 (C) 20 to 30 (D) 40 to 50	1	1	5

PART - B (5 × 4 = 20 Marks)

Answer **any 5** Questions

		Marks	BL	CO
21.	Discuss about the selectivity and stability of protective relay.	4	2	1
22.	Discuss the different types of VTs with their areas of application.	4	2	1
23.	Explain the protective scheme for parallel feeders.	4	3	2
24.	What is an impedance relay? Explain its operating principle.	4	3	2
25.	Write in brief about Bus bar protection scheme.	4	2	3

		Marks	BL	CO
26.	Draw the block diagram of a typical numerical Overcurrent relay.	4	3	4
27.	Discuss the various components of fault clearing time of a circuit breaker.	4	2	5

PART - C (5 × 12 = 60 Marks)

Answer **all** Questions

28.	(a) Explain in detail about the fundamental requirements of protective relaying.	12	3	1
	(OR)			
	(b) Discuss the classification of protective schemes.			
29.	(a) Draw a neat sketch of an induction type Directional Overcurrent relay and discuss its operating principle.	12	4	2
	(OR)			
	(b) Explain impedance relay characteristic on the R-X diagram. Discuss the range setting of three impedance relays placed at a particular location. Discuss why the I zone unit is not set for the protection of 100% of the line.			
30.	(a) With a neat sketch, discuss the differential scheme for bus bar protection.	12	3	3
	(OR)			
	(b) Discuss the protection employed against loss of excitation of an alternator.			
31.	(a) Draw the block diagram of a numerical percentage differential relay for the protection of power transformer and discuss its operation.	12	4	4
	(OR)			
	(b) Write in brief about (i) Digital protection, and (ii) Digital substation.			
32.	(a) Explain in detail, the terms: restriking voltage, recovery voltage and RRRV.	12	3	5
	(OR)			
	(b) Describe the construction, operating principle and application of vacuum circuit breaker. What are its advantages over conventional type circuit breakers?			

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