

Question 1

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What will be the operating time of an overcurrent relay following IEEE very inverse characteristic for a fault current of 600 A? Consider the pickup setting and TMS setting of the relay as 150 A and 1.5 respectively.

Select one or more:

- ☐ a. 2 s
- ☐ b. 3.5 s
- ☐ c. 1.6 s
- ☒ d. 2.7 s

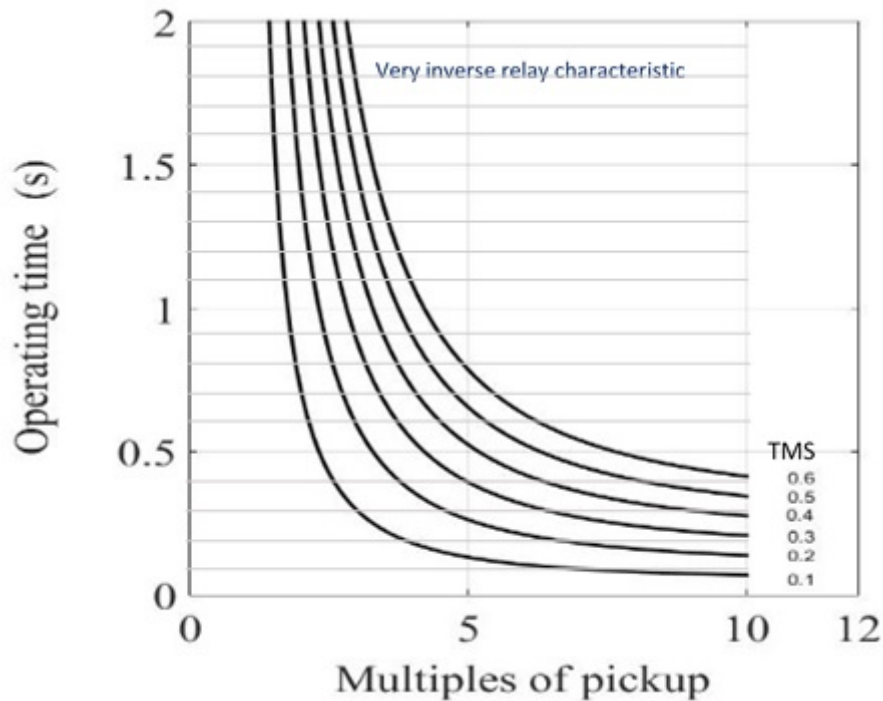


Question 2

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In a distribution system two adjacent relays have same CT ratios, 10:1. For a fault in the downstream of the two relays, the primary of the CTs see 300A current. Relay remote from the substation has pickup setting of 3 A and time multiplier setting (TMS) of 0.1. The other relay has pickup setting of 6 A and TMS setting of 0.3. Find the difference between the decision times by the two relays, which follow the following characteristics (shown in the plots).



Select one or more:

- ☐ a. 0.3 s
- ☐ b. 0.1 s
- ☒ c. 0.2 s
- ☐ d. 0.4 s

Question 3

Answer saved

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Overcurrent relay coordination provides

Select one or more:

- ☒ a. (A) Minimum fault current
- ☒ b. Pickup settings
- ☒ c. high speed fault clearance
- ☐ d. Selectivity



Question 4

Answer saved

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Which of following information is not required to obtain pickup setting of overcurrent relay?

Select one or more:

- ☒ a. Ratio of the CT connecting the relay
- ☒ b. Maximum fault current level
- ☐ c. Maximum load current level
- ☐ d. Minimum fault current level

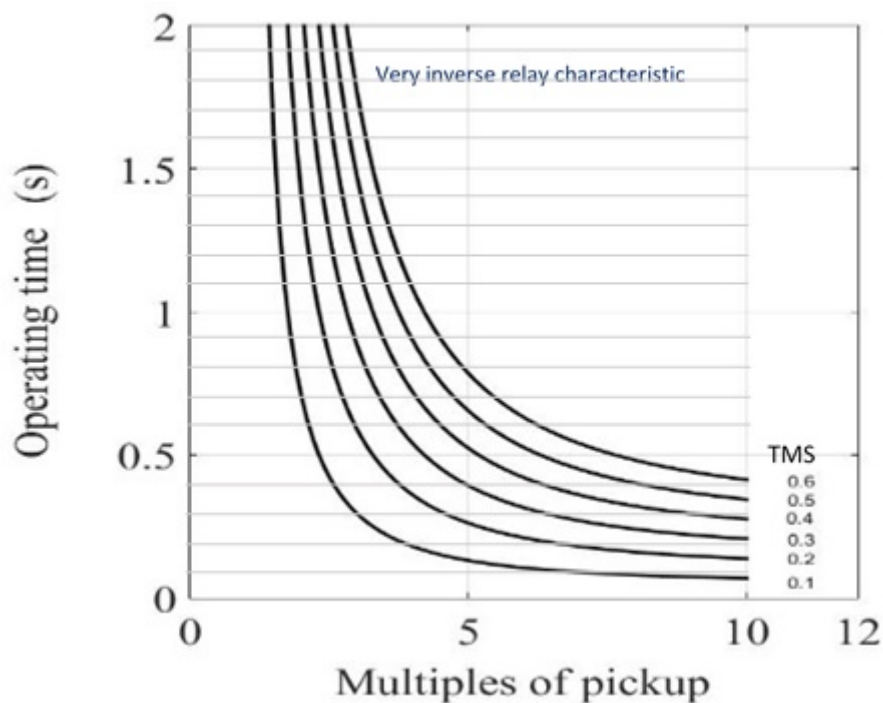
Question 5

Answer saved

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In a distribution system two adjacent relays have same CT ratios, 50:5. For a fault in the downstream of the two relays, the primary of the CTs see 100A current. Relay remote from the substation has pickup setting of 1 A and time multiplier setting (TMS) of 0.1. The other relay has pickup setting of 2 A. If the coordination time interval between the two relays is

0.3 s, find the TMS setting of the relay nearer to substation, which follow the following characteristics (shown in the plots).



Select one or more:

- ☐ a. 0.1
- ☒ b. 0.3
- ☐ c. 0.4
- ☐ d. 0.2

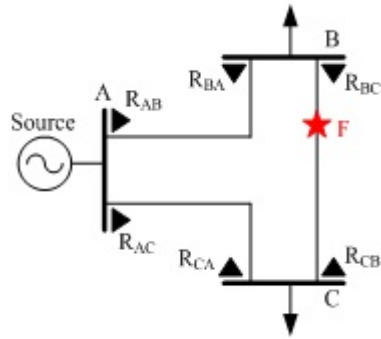


Question 6

Answer saved

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For the fault shown at F in the diagram, as the best option which relay(s) should operate corresponding breakers.



Select one or more:

- ☐ a. R_{CB}, R_{CA}
- ☒ b. R_{BC}, R_{CB}
- ☐ c. R_{BC}, R_{BA}
- ☐ d. R_{AB}, R_{CB}

Question 7

Answer saved

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Which of the following provides the correct information for directional-overcurrent relay experiment performed as in the laboratory?

Select one or more:

- ☐ a. Relay requires 220 V AC supply as input, but the trip coil does not require any supply for opening the breaker contact
- ☒ b. Phase angle of current signal is varied considering voltage signal as reference
- ☐ c. Phase angles of voltage and current signals are varied simultaneously
- ☐ d. Phase angle of voltage signal is varied considering current signal as reference with magnitude set above its pickup setting

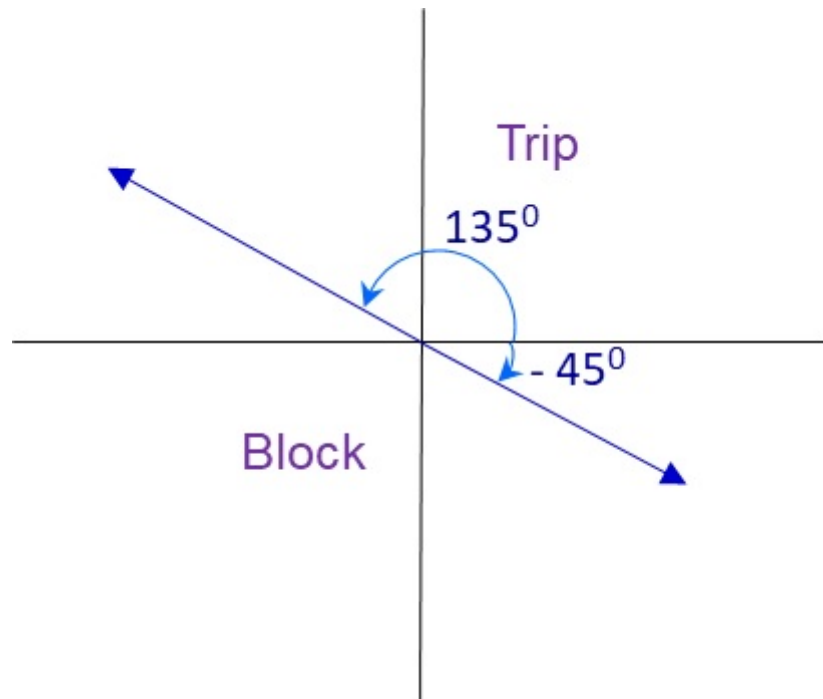


Question 8

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A directional overcurrent relay is set with a characteristic as shown below. The nominal current is 10 A and the pickup setting is 0.3 times of nominal current. For which of the following situations, the relay will generate trip signal



Select one or more:

- ☐ a. Fault current = 2.5 A, angle between voltage and current is 120°
- ☐ b. Fault current = 4.2 A, angle between voltage and current is -83°
- ☐ c. Fault current = 1.9 A, angle between voltage and current is -5°
- ☒ d. Fault current = 3.8 A, angle between voltage and current is 85°



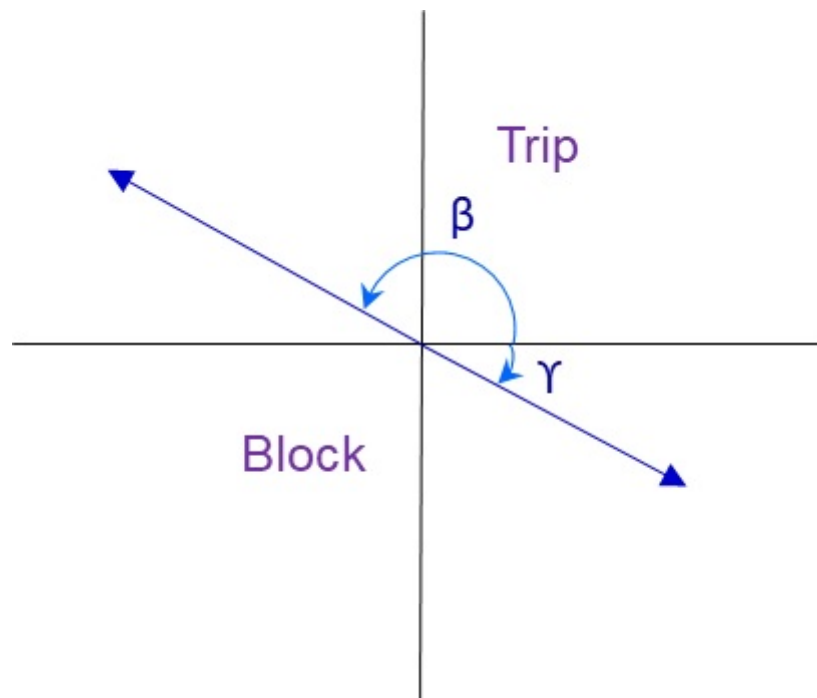
Question 9

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A directional overcurrent relay is set with a characteristic as shown below.

The relay decision observed in the experiment are provided below. What are the most suitable values for β and γ ?



Angle (V-I) (deg)	1	15	27	42	64	86	99	127	134	138	148	156	164	178
Trip/No trip (relay decision)	Trip	Trip	Trip	Trip	Trip	Trip	Trip	Trip	No trip	No trip	No trip	No trip	No trip	No trip

Angle (V-I) (deg)	-6	-18	-28	-39	-43	-46	-58	-71	-82	-105	-125	-154	-170	-176
Trip/No trip (relay decision)	Trip	Trip	Trip	Trip	Trip	Trip	No trip	No trip	No trip	No trip	No trip	No trip	No trip	No trip

Select one or more:

- ☒ a. $\beta = 130^\circ, \gamma = -50^\circ$
- ☐ b. $\beta = 170^\circ, \gamma = -10^\circ$
- ☐ c. $\beta = 135^\circ, \gamma = -45^\circ$
- ☐ d. $\beta = 90^\circ, \gamma = -90^\circ$



Question 10

Answer saved

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In the directional-overcurrent relay experiment, the relay is set with $\beta=1450$ and $\gamma=-350$ and pickup current = 0.3 kA. What will be the relay decision for following two cases of three phase fault?

Case-1		Case-2	
Voltage and current data during fault		Voltage and current data during fault	
$V_a: 23.65 \angle 88.27^\circ \text{ kV}$	$I_a: 0.60 \angle -174.73^\circ \text{ kA}$	$V_a: 23.65 \angle 78.27^\circ \text{ kV}$	$I_a: 0.60 \angle -41.73^\circ \text{ kA}$
$V_b: 24.09 \angle -29.89^\circ \text{ kV}$	$I_b: 0.61 \angle 63.14^\circ \text{ kA}$	$V_b: 24.09 \angle -39.89^\circ \text{ kV}$	$I_b: 0.61 \angle -159.89^\circ \text{ kA}$
$V_c: 23.21 \angle -149.93^\circ \text{ kV}$	$I_c: 0.58 \angle -55.38^\circ \text{ kA}$	$V_c: 23.21 \angle -159.93^\circ \text{ kV}$	$I_c: 0.58 \angle 80.07^\circ \text{ kA}$

Select one or more:

- ☒ a. Case-1: Trip, Case-2: No Trip
- ☐ b. Case-1: No Trip, Case-2: No Trip
- ☐ c. Case-1: Trip, Case-2: Trip
- ☐ d. Case-1: No Trip, Case-2: Trip

Question 11

Answer saved

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A transformer differential relay observes the presence of 2nd and 5th harmonic components as (9% and 41%) respectively of the fundamental component in the differential current. Such a situation indicates which of the following situation?

Select one or more:

- ☐ a. CT saturation
- ☐ b. Inrush
- ☐ c. High loading
- ☒ d. Overexcitation

Question 12

Answer saved

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The percentage biased differential characteristic for transformer protection

Select one or more:

- ☒ a. considers higher slope for higher restraint current
- ☐ b. uses only primary current when the secondary side CT saturates
- ☐ c. uses differential current of 5th harmonic
- ☐ d. does not consider magnetizing current



Question 13

Answer saved

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Which of the following is not considered for percentage biased differential relay setting for transformer

Select one or more:

- ☒ a. CT saturation
- ☒ b. CT ratio error
- ☐ c. Magnetizing current
- ☐ d. Maximum fault resistance

Question 14

Answer saved

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Which of the following is not correct regarding transformer differential relay experiment?

Select one or more:

- ☐ a. 2nd harmonic blocking is required to avoid false tripping during energization
- ☒ b. High differential current is required to trip the relay in higher loading condition
- ☐ c. Relay sensitivity increases with higher bias setting
- ☐ d. Differential current increases with lower fault resistance

Question 15

Answer saved

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Which of the following harmonic component becomes the most dominant in case of transformer inrush situation?

Select one or more:

- ☐ a. 3rd
- ☒ b. 4th
- ☐ c. 5th
- ☒ d. 2nd

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