

GE5 Power System Protection

[EE304](#)

[Power System Protection](#)

Part 1 Lectures

[G015\(AE\)Lesson 1-Power system protection scheme.zip](#)

<http://youtu.be/iHPd3cDAhBU>

<http://youtu.be/EGXkLRM2L9M>

<http://youtu.be/zOIUYQ7OJfs>

http://www.filefactory.com/file/c0ba70c/n/G015_AE_Lesson_1-Power_system_protection_scheme.zip

[G015\(AE\)Lesson 2-Differential relay.zip](#)

<http://youtu.be/2iW0oEScMsw>

http://www.filefactory.com/file/c0ba752/n/G015_AE_Lesson_2-Differential_relay.zip

[G015\(AE\)Lesson 3-Over current & earth fault protection.zip](#)

<http://youtu.be/hvGjdO9jEhk>

[http://www.filefactory.com/file/c0ba8ac/n/G015\(AE\)Lesson_3-Over_current_&_earth_fault_protection.zip](http://www.filefactory.com/file/c0ba8ac/n/G015(AE)Lesson_3-Over_current_&_earth_fault_protection.zip)

[G015\(AE\)Lesson 4-Three phase differential relay.zip](#)

<http://youtu.be/2iW0oEScMsw>

<http://youtu.be/VuzjXkRx4UI>

<http://youtu.be/2iW0oEScMsw>

http://www.filefactory.com/file/c0ba819/n/G015_AE_Lesson_4-Three_phase_differential_relay.zip

[G015\(AE\)Lesson 5-Current time grading.zip](#)

<http://youtu.be/r0QkLrmkKsM>

G015AE Lesson 6

http://youtu.be/InsTLh7_N5k

http://www.filefactory.com/file/c0ba875/n/G015_AE_Lesson_5-Current_time_grading.zip

[G015\(AE\)Lesson 7-CT PT.zip](#)

http://youtu.be/ZF_y65xsM_M

[http://www.filefactory.com/file/c0ba908/n/G015\(AE\)Lesson_7-CT_PT.zip](http://www.filefactory.com/file/c0ba908/n/G015(AE)Lesson_7-CT_PT.zip)

G015(AE)Lesson 8-Distance relay.zip

<http://youtu.be/NKzMVquFLu8>

http://www.filefactory.com/file/c386a2e/n/G015_AE_Lesson_8-Distance_relay.zip

[G015\(AE\)Lesson 9-Telecom in power protection.zip](#)

<http://youtu.be/9C6ogqZAKRg>

http://youtu.be/XRpffA6hU_U

<http://youtu.be/X-kz3cyL9fU>

http://www.filefactory.com/file/c0bbacb/n/G015_AE_Lesson_9-Telecom_in_power_protection.zip

CLASS LESSONS

[AE.zip](#)

<http://www.filefactory.com/file/c0b7ff7/n/AE.zip>

Part 2 References

Notes

http://www.filefactory.com/file/4zh9w5ccguwh/G046_7762AE_Notes.pdf

Exercise

Do G015AE Page 123 to 130 of the following link

[http://www.filefactory.com/file/c0b7da3/n/Advanced Diploma in Electrical Engineering Exercises .zip](http://www.filefactory.com/file/c0b7da3/n/Advanced_Diploma_in_Electrical_Engineering_Exercises.zip)

Part 3 Practicals

Circuit Breakers & Switch Boards

Switch board Circuit breaker Installation 3.mp4 (33.81MB)

[http://www.filefactory.com/file/wagt5a5bjz/n/Switch board Circuit breaker Installation 3.mp4](http://www.filefactory.com/file/wagt5a5bjz/n/Switch_board_Circuit_breaker_Installation_3.mp4)

Switch board Circuit breaker Installation 2.mp4 (0.39MB)

[http://www.filefactory.com/file/353v5nppktwf/n/Switch board Circuit breaker Installation 2.mp4](http://www.filefactory.com/file/353v5nppktwf/n/Switch_board_Circuit_breaker_Installation_2.mp4)

Switch board Circuit breaker Installation 1.mp4 (167.18MB)

[http://www.filefactory.com/file/1avuobq7fh9z/n/Switch board Circuit breaker Installation 1.mp4](http://www.filefactory.com/file/1avuobq7fh9z/n/Switch_board_Circuit_breaker_Installation_1.mp4)

Removal of link to disconnecting circuit breaker 132KV.mp4 (108.08MB)

[http://www.filefactory.com/file/6d0xw9fdrpvr/n/Removal of link to disconnecting circuit breaker 132KV.mp4](http://www.filefactory.com/file/6d0xw9fdrpvr/n/Removal_of_link_to_disconnecting_circuit_breaker_132KV.mp4)

Line breaker action.mp4 (16.58MB)

[http://www.filefactory.com/file/4mnkpfnq84tr/n/Line breaker action.mp4](http://www.filefactory.com/file/4mnkpfnq84tr/n/Line_breaker_action.mp4)

Circuit Breaker Operation.mp4 (22.04MB)

[http://www.filefactory.com/file/4kf6zjzkkuzh/n/Circuit Breaker Operation.mp4](http://www.filefactory.com/file/4kf6zjzkkuzh/n/Circuit_Breaker_Operation.mp4)

Circuit Breaker Testing.mp4 (85.51MB)

[http://www.filefactory.com/file/772y45oyb2al/n/Circuit Breaker Testing.mp4](http://www.filefactory.com/file/772y45oyb2al/n/Circuit_Breaker_Testing.mp4)

Circuit Connection Assessment Number 3-4 Over Current Relay

[http://www.filefactory.com/file/1ufyhhdtxvnd/n/Practical Semester 1 A .pdf](http://www.filefactory.com/file/1ufyhhdtxvnd/n/Practical_Semester_1_A.pdf)

[http://www.filefactory.com/file/6fhmwq8kenzx/n/3-4 .pdf](http://www.filefactory.com/file/6fhmwq8kenzx/n/3-4.pdf)

[http://www.filefactory.com/file/2ncfb8i5jlh/n/3_4 .xls](http://www.filefactory.com/file/2ncfb8i5jlh/n/3_4.xls)

http://www.filefactory.com/file/n2vd5iew8ob/n/3_4_doc

Circuit Connection Assessment Number 3-4 Over Current Relay

[Over current relay test](#)

[Relay Trade Reference](#)

[CT Ratio](#)

http://www.filefactory.com/file/1ufyhhdtxvnd/n/Practical_Semester_1_A_pdf

http://www.filefactory.com/file/6fhmwq8kenzx/n/3-4_pdf

http://www.filefactory.com/file/2ncfb8i5jlh/n/3_4_xls

http://www.filefactory.com/file/n2vd5iew8ob/n/3_4_doc

Online Test

G015+G046

[G015+G046 MCQ Practice 1](#)

[G015+G046 MCQ Practice 2](#)

[G015+G046 MCQ Practice 3](#)

[G015+G046 MCQ Practice 4](#)

[G015+G046 MCQ Practice 5](#)

G037+G038+G039

[G037+G038+G039 MCQ Practice 1](#)

[G037+G038+G039 MCQ Practice 2](#)

[G037+G038+G039 MCQ Practice 3](#)

[G037+G038+G039 MCQ Practice 4](#)

[G037+G038+G039 MCQ Practice 5](#)

Online Test Marking

G015+G046 Test 1-----UETTD RIS 67+68+74

http://www.filefactory.com/file/4jzmn6sa4rkd/n/G015_G046_Online_Test_1_Answer_doc

http://www.filefactory.com/file/50ox6xeklufp/n/G015_G046_Online_Test_1_Question_pdf

http://www.filefactory.com/file/5eai2er97faz/n/G015_G046_Online_Test_1_Marking_doc

<http://www.classroomclipboard.com/503511/Home/Test/67dbfd25caa3484498a850f3b1050457#/InitializeTest.xml>

G9UCJ

G015+G046 Test 2-----UETTD RIS 67+68+74

http://www.filefactory.com/file/1s822zs1jz89/n/G015_G046_Online_Test_2_Question_pdf

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http://www.filefactory.com/file/72nnb9tokazx/n/G015_G046_Online_Test_2_Answer_doc

<http://www.classroomclipboard.com/503511/Home/Test/204b4231f0ea4492986ce2ec11302704#/InitializeTest.xml>

FSXU

G015+G046 Test 3-----UETTD RIS 67+68+74

http://www.filefactory.com/file/4vsjt10eyxbr/n/G015_G046_Online_Test_3_Marking_doc

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http://www.filefactory.com/file/6pcivv5e0y05/n/G015_G046_Online_Test_3_Question_pdf

<http://www.classroomclipboard.com/503511/Home/Test/542fb0501a334d8788c68c19208e96e1#/InitializeTest.xml>

JE3W

G015+G046 Test 4-----UETTD RIS 67+68+74

http://www.filefactory.com/file/11r4pppif5fz/n/G015_G046_Online_Test_4_Marking_doc

http://www.filefactory.com/file/4obspr3n1fkf/n/G015_G046_Online_Test_4_Question_pdf

http://www.filefactory.com/file/11r4pppif5fz/n/G015_G046_Online_Test_4_Marking_doc

<http://www.classroomclipboard.com/503511/Home/Test/faf4fd339f25425784a5c04d186fe5db#/InitializeTest.xml>

CCLV2SN

G015+G046 Test 5-----UETTD RIS 69

http://www.filefactory.com/file/5t1q4kveec4v/n/G015_G046_Online_Test_5_Question_pdf

http://www.filefactory.com/file/6kjomzcib4z/n/G015_G046_Online_Test_5_Marking_doc

http://www.filefactory.com/file/1059gjdiyfqf/n/G015_G046_Online_Test_5_Answer_doc

<http://www.classroomclipboard.com/503511/Home/Test/0fd45546932d49dbb628fee5cbbaed7b#/InitializeTest.xml>

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EE205 Electrical Power System

Tutoring Lessons

[EE205 Part 1](#) [EE205 Part 2](#) [EE205 Part 3](#) [EE205 Part 4](#) [EE205 Part 5](#)

[EE205 Part 6](#) [EE205 Part 7](#) [EE205 Part 8](#) [EE205 Part 9](#) [EE205 Part 10](#)

[EE205 Part 11](#) [EE205 Part 12](#) [EE205 Part 13](#)

Test & Assessment

http://www.filefactory.com/file/22ti8gb92ekf/n/G037_G038_G039_Online_Test_1_Answer_doc

http://www.G037+G038+G039_Test_1_Question.pdf

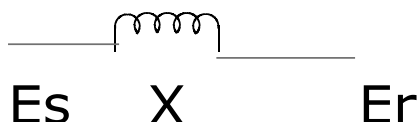
Do the tests and send the answer sheet in soft copy by e-mail to
iqytechnicalcollege@gmail.com

Password- **[iqytechnicalcollege](#)**

Study the notes in the EE205 files & do the exercise

G037+G038+G039 Online Test

Ref257



$E_r = 200V$, $X = 5 \Omega$ $P = 1000 \text{ watt}$ $Q = 500 \text{ VAR}$

The value of E_s is

A	400V	B	200V
C	213.9V	D	120V
Answer			

Ref262

To provide physical damage to building & equipments due to direct and indirect lightning strike.

A	Circuit protection device to be provided	B	Equalizer to be provided
C	Site earthing to be provided	D	PF must be improved.
Answer			

Ref267

Which equipment is not included in power system equipment?

A	Main feeder	B	Consumer main
C	Sectionalising busbar	D	Recloser
Answer			

Ref292

The current in a system is 62.5A in which 59 amp is fundamental. Calculate total harmonic distortion . If the harmonic is combination of 3rd, 5th and 7th and third harmonic is 15.6A, 5th harmonic is 10.3A, find 7th harmonic.

A	60% 10A	B	34.9% 8.66A
C	70% 3A	D	15% 2A
Answer			

Ref297

Earthing cable is to be connected to

A	Star point of star connected winding	B	Neutral conductor
C	Circuit breaker	D	
Answer			

Ref302

Arc lengthening , arc splitting and arc cooling functions are provided in

A	Relay	B	Circuit breaker
C	Busbar	D	Recloser
Answer			

Ref307

Switching transient causes

A	Disruption of normal operation	B	Degrading of components
C	Damage to equipments	D	All above
Answer			

Ref312

The lightning strike can directly at

A	SPZOA	B	SPZ1
C	SPZ2	D	SPZ3
Answer			

Ref317

The short duration reduction in the rms voltage between 0.1 and 0.9 pu caused by energizing the heavy load, single line to ground fault and load transfer from one source to remote source is

A	Sag	B	Swell
C	Surge	D	
Answer			

Ref322

Sinusoidal wave becomes other forms of wave is

A	Voltage imbalance	B	Transient
C	Waveform distortion	D	Voltage reduction
Answer			

Ref327

If the voltage is increased , the solution is to provide

A	Use properly tuned filter	B	Use surge detector
C	Use equalizer busbar	D	Use equipotential bonding
Answer			

Ref332

The circuit consists of 100 V 60HZ and 5th harmonic 51V 300HZ in series with 24 ohm resistor & 18.6 mH inductor. Calculate total dissipated power.

A	209 W	B	104.5W
C	418.6W	D	836W
Answer			

Ref337

Two units of generator maintain 66KV and 60KV line at the end of an interconnector of inductive reactance per phase of 40 ohm with negligible resistance and shunt capacitance . A load of 10 MW is to be transferred from 66KV unit to the other end. Calculate the PF of the current transmitted.

A	0.1	B	0.2
C	0.3	D	0.4
Answer			

EE304 Power System Protection

The students who complete EE 205 also complete EE304

ADDITIONAL QUESTIONS

G015+G046 Online Test

Ref186

The transformer supplies a group of 4 feeders which have individual maximum demands of 2.5, 2.4, 4.3 and 1.6 MVA. If the diversity factor is 1.82, determine the maximum demand on transformer

A	5.93MVA	B	4.3MVA
C	10.8MVA	D	2.4MVA
Answer			

Ref191

Find the insulation resistance per km of conductor diameter 1.6 cm and internal sheath diameter 5.08 cm. $\gamma = 6 \times 10^{-14} \Omega/\text{cm}$.

A	500 M Ω	B	100 M Ω
C	1103 M Ω	D	2000 M Ω
Answer			

Ref196

The formula to calculate voltage regulation is

A	$\% \text{Reg} = \frac{IR \cos \phi_r + IX \sin \phi_r}{E_r}$	B	$\% \text{Reg} = \frac{R \cos \phi_r + IX \sin \phi_r}{E_r}$
C	$\% \text{Reg} = IR \cos \phi_r + IX \sin \phi_r$	D	$\% \text{Reg} = \frac{R \cos \phi_r - IX \sin \phi_r}{E_r}$
Answer			

Ref201

Which equipments is not included in trip circuit?

A	Sensor, potential transformer, current transformer	B	Battery
C	Relay contact	D	Circuit breaker
Answer			

Ref206

Differential relay senses

A	Only one input	B	Three inputs
C	Two inputs	D	Four inputs
Answer			

Ref 211.

Maximum reach and maximum reach angle are found in

A	Over current relay	B	Differential relay
C	Directional relay	D	Distance relay
Answer			

Ref212

The operation of distance relay is based on

A	Based on impedance	B	Based on current
C	Based on frequency	D	Based on power
Answer			

Ref213

The characteristics curve of distance relay is

A	Concentric circles	B	Parabola
C	Straight line	D	Hyperbola
Answer			

Ref214.

Zone protection of distance relay is based on

A	Zoning in accordance with voltage	B	Zoning in accordance with current
C	Zoning in accordance with power	D	Zoning in accordance with impedance
Answer			

Ref215.

Operating & restraining voltage and current are utilized in

A	Over current relay	B	Differential relay
C	Directional relay	D	Thermal over load relay
Answer			

Ref216

Power line can be effectively protected by

A	Over current relay	B	Differential relay
C	Directional relay	D	Distance relay
Answer			

Ref217

Explain the operation of distance relay is based on .

A	Based on impedance	B	Based on current
C	Based on frequency	D	Based on power
Answer			

Ref218.

The shape of characteristics of over current relay is

A	Straight line	B	Circle
C	Curve	D	Pulse
Answer			

Ref219.

Directional relay is also called

A	Distance relay	B	Reverse power relay
C	Differential relay	D	Over current relay
Answer			

Ref220

Earthing transformer is utilized at

A	Star connected winding side	B	Delta connected winding side
C	Zigzag connected winding side	D	None of above
Answer			

Ref225

In CT, primary and secondary windings

A	Closely linked	B	Loosely linked
C		D	
Answer			

Ref230

The following equation

 $M_c \frac{d^2\delta}{dt^2} = P_o - P_m \sin \delta$ is utilized to determine

A	Stability of generation	B	Power flow
C	Phase sequence	D	
Answer			

Ref231

The suitable winding method for earthing transformer is

A	Star/ Delta	B	Delta/Star
C	Delta/Delta	D	Zig Zag
Answer			

Ref232

Reactors are utilized at busbar to

A	Provide inductance	B	Limit short circuit current
C	Increase disruptive critical voltage	D	Earth leakage current flow path
Answer			

Ref233

The best way to increase the level of disruptive critical voltage to reduce the possibility of corona is

A	To increase conductor diameter	B	To use longer cross arm
C	To use hollow conductor that increase the conductor diameter	D	To increase insulation resistance
Answer			

Ref234

Switching voltage velocity is

A	$V = 1/\sqrt{LC}$	B	$V = \sqrt{LC}$
C	$V = L/C$	D	$V = 1/LC$
Answer			

Ref235

Which equipment is used in static VAR compensation system?

A	Magnetic contactor	B	Thermal switch
C	Hall effect switch	D	Silicon Controlled Rectifier
Answer			

Ref236

Poor power will cause

A	Unnecessary over current flow in line	B	Smoother voltage
C	Ripple reduction	D	Wrong phase sequence
Answer			

Ref237

Lighting strike near power transformer is protected by

A	Arcing horn	B	Lightning arrester
C	Surge absorber	D	Arcing ring
Answer			

Ref238

Lightning protection for power line is provided by

A	Arcing horn	B	Lightning arrester
C	Surge absorber	D	Arcing ring
Answer			

Ref239

Power surge protection is provided by

A	Arcing horn	B	Lightning arrester
C	Surge absorber	D	Arcing ring
Answer			

Ref244

In large power distribution system, reactive power control is provided by

A	Synchronous motor	B	Capacitor bank
C	Static VAR Compensation System	D	Induction motor
Answer			

Ref249

To withstand the voltage surge due to lightning strike, the power system equipments must have

A	High VA value	B	High voltage rating
C	High current rating	D	Appropriate base impulse insulation level
Answer			

Ref254

The following formula $E_g = m\delta g_0 r \ln D/r$ is utilized to calculate

A	Sending end voltage	B	Breakdown voltage to neutral
C	Visual critical voltage	D	Disruptive critical voltage.
Answer			

Ref208

Can over current & earth fault protections be combined?

A	Not sure	B	No
C	Yes	D	Not applicable
Answer			

Ref222

Buchholz relay should be utilized for

A	Transformer protection	B	Motor protection
C	Generator protection	D	Power line protection
Answer			

Ref224

For given CT , % composite error, secondary voltage and rated accuracy are 10P 150 F15

A	10%, 150V, 15	B	150%, 10V, 15
C	15%, 15V, 10	D	
Answer			

Ref226

For 2000/1000/500/1 current transformer 10 Ps 250 is classified as

A	2.5 Ps 1000	B	5 Ps 500
C	2.5Ps 500	D	10 Ps 250
Answer			

G015+G046 Online Test

Ref187

Calculate allowable sag of 7/3.50 hard drawn copper overhead line conductor span of 150m. The wind loading is 500 pa. Maximum tension is 60% of ultimate strength.

Ultimate strength= 26600N

Gravitational force= 5.94 N/ m

Diameter of conductor = 10.5 mm

A	3.2 m	B	5 m
C	1.678 m	D	0.8m
Answer			

Ref192

In above problem, if the cable is subject to 66 KV, three phase line, find the dielectric loss.

A	3 watt	B	1.316 watt
C	7 watt	D	10 watt
Answer			

Ref197

Which one is not a voltage control equipment?

A	Off load tap changer	B	On load tap changer
C	Booster transformer	D	Lightning arrester
Answer			

Ref202

Which is not included in basic qualities of power system?

A	Speed	B	Future forecast of load
C	Discrimination	D	Reliability
Answer			

Ref207

The grading of time is

A	Directly proportional to the grading of current	B	Inversely proportional to the grading of current
C			
Answer			

Ref221

In given specification, 10 amp / 150/40/200 the relay contacts close in

A	150 cycle	B	40 cycle
C	200 cycle	D	10 cycle
Answer			

Ref226

For 2000/1000/500/1 current transformer 10 Ps 250 is classified as

A	2.5 Ps 1000	B	5 Ps 500
C	2.5Ps 500	D	10 Ps 250
Answer			

Ref240

Equal areas criterion is utilized for

A	Calculating phase sequence	B	Calculating power flow
C	Calculating stability	D	Calculating power factor
Answer			

Ref245

Fuel cell is a

A	Electromechanical conversion device	B	Electromagnetic device
C	Electrohydraulic device	D	Electrochemical conversion device
Answer			

Ref250

In parallel operation of two generators which equipment is utilized to determine to connect them?

A	Synchroscope	B	Power meter
C	Voltmeter	D	Frequency meter
Answer			

Ref255

A transmission line has 0.0125 μF capacitance 1.5 mH inductance . It is joined with a cable of 0.3 μF capacitance & 0.25 mH inductance. Calculate Maximum voltage at junction.

Line to line voltage = 50KV

A	50 KV	B	30 KV
C	25 KV	D	92.5 KV
Answer			

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