Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **M.Tech**
EEPE209

2nd Semester Back Examination 2017-18
COMPUTER AIDED POWER SYSTEM PROTECTION
BRANCH : ELECTRI & ELECTRO ENGG (POWER SYSTEM ENGG), ELECTRICAL POWER SYSTEM, POWER SYSTEM ENGG, POWER SYSTEM
Time : 3 Hours
Max Marks : 70
Q.CODE : C1055
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.
Answer all parts of a question at a place.

Q1 **Answer the following questions :** **(2 x 10)**

a) What is substation computer hierarchy?
b) What is the function of anti-aliasing filter in digital relaying scheme?
c) Enumerate various benefits of computer relaying.
d) What are the sources of error in the transmission line relaying?
e) Why is the field winding of alternator grounded?
f) Within how many cycles should the digital bus protection scheme operate?
g) What is the application of Capacitive Voltage Transformer(CVT)?
h) What is sampling clock synchronization?
i) How is phasor measurement applied in state estimation?
j) What is the principle of travelling wave differential relays?

Q2 **a)** Give the computer relay architecture and explain its functional features. **(5)**

b) The specifications of an A/D converter are **(5)**
$T_{conversion}$ =50 μsec, ±10 V bipolar sinusoidal input and 12 bits.
Find the resolution of the converter and the highest frequency of the input sinusoidal voltage, without a sample-hold capacitor, that the A/D converter can convert within ±1/2 bit accuracy.

Q3 **a)** Explain the restricted earth fault protection of power transformer using a neat diagram. **(5)**

b) Explain the effect of CT saturation on busbar protection. **(5)**

Q4 **a)** Give the protection schematic of series compensated lines and explain the principle. **(5)**

b) Explain how discrete fourier transform (DFT) is used for implementing protective relaying algorithm? **(5)**

Q5 **a)** Why is a time delayed relay required for reverse power protection of a generator? Explain with relevant circuit diagram. **(5)**

b) What are the counter measures taken against EMI in the integrated system of relaying? Explain any one in brief giving circuit diagram. **(5)**

Q6 **a)** Explain how phasor measurement is used in dynamic state estimation. **(5)**

b) Enumerate various features of travelling wave distance relay with relevant diagram. **(5)**

Q7 Explain the working principle of directional wave relay with schematic diagram and relevant waveforms. **(10)**

Q8 **Write short answer on any TWO :** **(5 x 2)**

a) Bus protection

b) Symmetrical component distance relay

c) Travelling waves on three phase lines

d) Adaptive relaying