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6E6071

6E6071

B.Tech. VI Semester (Main & Back) Examination, April/May-2017
Electrical & Electronic Engineering
6EX1A Modern Control Theory
EE,EX

Time : 3 Hours   **Maximum Marks : 80**
                                                      Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **five** questions, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitable be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.*

Unit-I

1. a) Determine the domain of following function :   (4)

    $$f(x) = \sqrt{4x - 8}$$

    b) Show that the vectors are linearly dependent   (4)

    $\alpha_1 = [2, 3]$, $\alpha_2 = [1, 1]$, and $\alpha_3 = [4, 5]$

    c) Explain in brief about time invariant system.   (4)

    d) Write a short note on linear and non linear system.   (4)

OR

1. a) Show that the vectors $x_1 = (1, -1, -2, -4)$, $x_2 = (2, 3, -1, -1)$, $x_3 = (3, 1, 3, -2)$, and $x_4 = (6, 3, 0, -7)$ are linearly dependent. Also find relationship among them.   (4)

    b) Find the domain of function $f(x) = \dfrac{\sqrt{-x}}{(x-3)(x+5)}$.   (4)

    c) Write a short note on Relaxedness and causality of a system.   (4)

    d) Define domain and range of function with suitable examples.   (4)

6E6071/2017   (1)   [Contd....]

Unit-II

2. a) Construct the state model for a system characterized by the differential equation. **(8)**

$$\dddot{y} + 5\ddot{y} + 7\dot{y}\,9y = 8u$$

   b) Express the following transfer function (Tf) in a state model

$$\frac{y(s)}{u(s)} = \frac{1}{s^3 + 6s^2 + 11s + 6}.$$ **(8)**

OR

2. a) Find the state model for following transfer function (Tf) : **(8)**

$$\frac{y(s)}{u(s)} = \frac{1}{(s+1)}\frac{1}{(s+2)}\frac{1}{(s+3)}$$

   b) Construct the state model in Jordan's canonical form for a system whose transfer function (Tf) is given by $\dfrac{y(s)}{u(s)} = \dfrac{10}{(s+1)^2(s+2)}$. **(8)**

Unit-III

3. a) Derive the ackermann's formula for the evaluation of state feedback gain. **(8)**

   b) Find the eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 1 & 2 & 0 \\ 2 & 1 & -6 \\ 2 & -2 & 3 \end{bmatrix}$. **(8)**

OR

3. a) A system characterized by the transfer function $\dfrac{y(s)}{u(s)} = \dfrac{2}{s^3 + 6s^2 + 11s + 6}$. Test the controllability and absorbability of the system. **(8)**

   b) Consider the state equation : **(8)**

$$\begin{bmatrix} \dot{x}_1(t) \\ \dot{x}_2(t) \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}\begin{bmatrix} x_1(t) \\ x_2(t) \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix}u(t)$$

   Obtain the state transition matrix.

Unit-IV

4. Find the z transform of following function :   (2×8=16)

   i) $x(n) = (-1)^n u(n)$

   ii) $x(n) = (1/4)^n u[-n+3]$

OR

4. Define and prove initial and final value theorem.   (16)

Unit-V

5. a) Write a short note on modeling of sample-hold circuits.   (8)

   b) Write a short note on stability in z-plane.   (8)

OR

5. a) Write a short note on digital PID controllers.   (8)

   b) Write a short note on adaptive control system.   (8)

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6E6072

6E6072

B.Tech. VI Semester (Main/Back) Examination, April/May - 2017
Elect. Engg.
6EE2A High Voltage Engineering

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitable be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

Unit - I

1. a) Define Townsend's first and second ionization coefficients. Explain Townsend's criteria for a spark. **(8)**

    b) Explain clearly suspended particle mechanism of liquid break down. **(8)**

OR

1. a) What are treeing and Tracking? Explain clearly the two processes in solid dielectrics. **(8)**

    b) Discuss the application of gases in Power System. **(8)**

Unit - II

2. a) Explain the steps of generation of high D.C. Voltage in detail. **(8)**

    b) Discuss about the Mark's multistage impulse generator. **(8)**

OR

2. a) Explain the different schemes for cascade connection of transformer for producing very high voltage. **(8)**

    b) Write short note on Klydonograph. **(8)**

Unit - III

3. a) Discuss about high voltage schering bridge. What are its applications. (10)

b) What is partial discharge? Compare between wide band and narrow band partial discharge. (6)

OR

3. a) Explain the method by which resistivity of a dielectric can be measured. (8)

b) Write short notes on (8)

    i) Dielectric constant   ii) Loss factor

Unit - IV

4. a) Explain the simpson's theory of charge accumulation in thunder clouds. Describe the mechanism of lightning strokes. (10)

b) Explain refraction of travelling wave at T junction. (6)

OR

4. a) What are the mechanisms by which lightning strokes develop and induce over voltage on over head power lines. (10)

b) Explain the terms attenuation and distortion of travelling waves propagating on overhead lines. (6)

Unit - V

5. a) Explain insulation coordination problem. Describe the basic impulse insulation levels. (8)

b) Describe the volt time curves construction and purpose by drawing neat diagram and mentioning all specifications of curve in diagram. (8)

OR

5. Explain Various types of lightning arrestors in detail. (16)

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6E6073

6E6073

B.Tech. VI Semester (Main/Back) Examination, April/May - 2017
Elect. Engg
6EX3A Switchgear & Protection
EE,EX

Time : 3 Hours   **Maximum Marks : 80**
                                                      Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **five questions**, selecting **one question** from **each unit**. All questions
carry **equal** marks. (Schematic diagrams must be shown wherever necessary.
Any data you feel missing suitable be assumed and stated clearly. Units of
quantities used/calculated must be stated clearly.*

Unit-I

1. a) Classify relay according to their construction, application and principle of
      operation and time of operation.   **(10)**

   b) Write a short note on "Phase splitting type amplitude comparator".   **(6)**

(OR)

1. a) Explain the Hall effect devices. How can they be used as phase comparator?
                                                                            (8)

   b) Name of the coincidence circuit type phase comparator. Explain direct phase
      comparison techniques.   **(8)**

Unit-II

2. a) A 3–ϕ, 15 MVA, 11KV star connected generator is protected by the current
      balancing system of protection. If the ratio of CT is 1200/5, the minimum
      operating current of the relay is 0.7A and the neutral point earthing resistance
      is 5.5Ω. Calculate the percentage of each phase of state winding which is
      unprotected against earth faults when the machine is operating at normal
      voltage.   **(8)**

b) Discuss all the factors on which protective gear for transformer depends and also discuss differential protection for it. **(8)**

(OR)

2. a) Derive torque equation for reactance relay with construction diagram and operating characteristic. **(8)**

b) Write a short note on choice between impedance, reactance and MHO relay. **(8)**

Unit-III

3. a) Discuss about carrier assisted and carrier block scheme of distance protection. **(10)**

b) Write a short note on power swings. **(6)**

(OR)

3. a) What do you understand by out of step blocking? Discuss the operating principle of an out of step bloching relay. **(8)**

b) Draw and explain the circuit connection of three MHO units used at a particular location for three zones of protection. **(8)**

Unit-IV

4. a) Explain Arc interruption theories. **(8)**

b) In a short circuit test on a circuit breaker, the following data was obtained on a frequency transient. **(8)**

   i) Time to reach the peak restriking voltage, 55 μs.

   ii) The peak restriking voltage, 100 KV. Calculate the

      a) Natural frequency of the circuit

      b) Average rate of rise of restriking voltage

(OR)

4. a) Discuss Air circuit breaker construction and working principle. **(8)**

b) Derive the expression for resistance to be connected across the breaker contacts and calculate the same for given data. L = 4.5H, C = 0.02 μf. **(8)**

6E6073 (2)

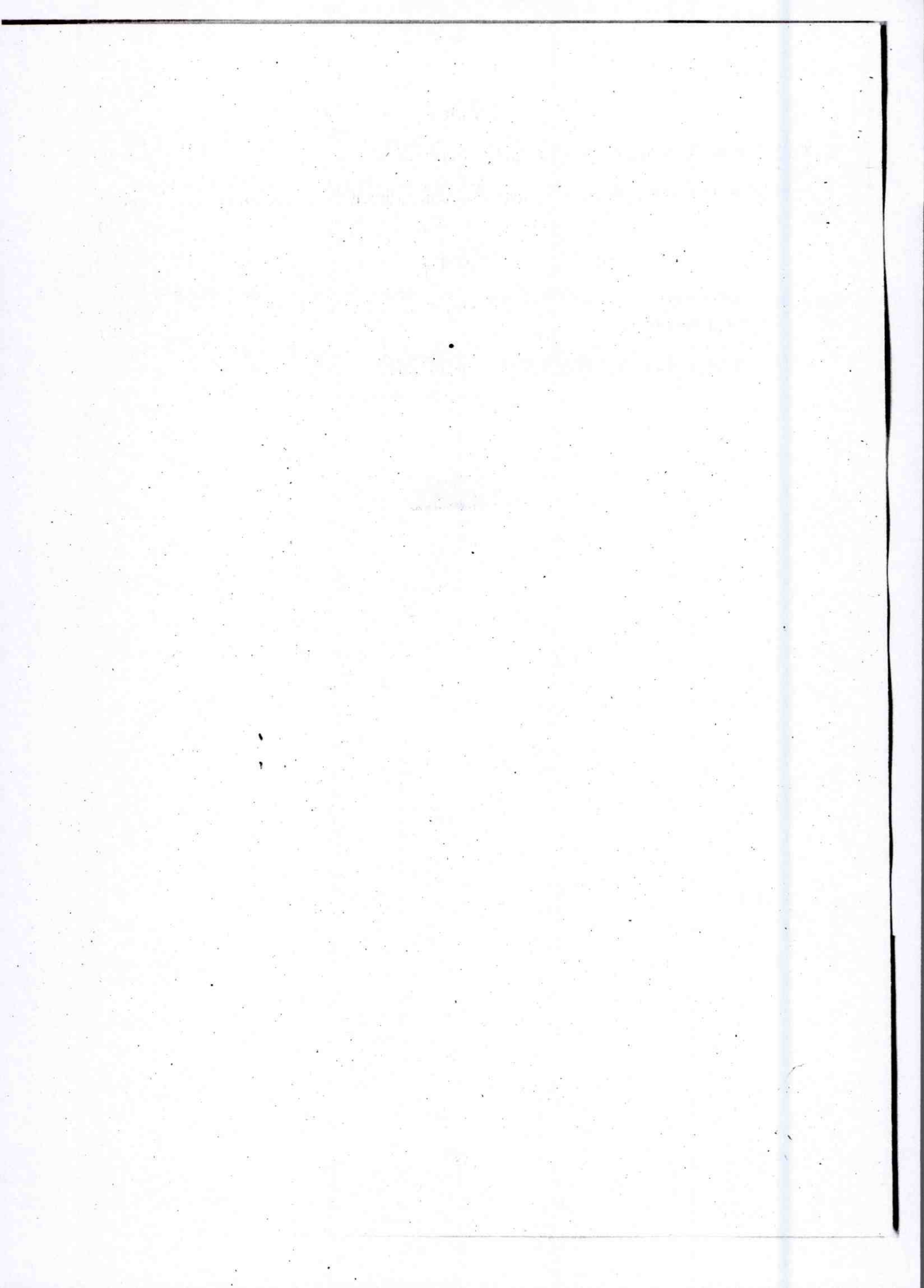## Unit-V

5. a) Write a short note on air blast circuit breaker. **(8)**

   b) Write a short note on construction and advantage of vacuum circuit breaker. **(8)**

(OR)

5. a) Write a note on selection of circuit breaker and discuss the advantages of SF_6 circuit breaker. **(10)**

   b) Write a short note on rating of circuit breaker. **(6)**

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6E6074

6E6074

B.Tech. VI Semester (Main/Back) Examination, April/May - 2017
Electrical & Electronics Engg.
6EX4A Advanced Power Electronics
EE,EX

Time : 3 Hours   **Maximum Marks : 80**
                                                     Min. Passing Marks : 26

Instructions to Candidates:

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitable be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.

Unit - I

1. a) Explain the operation of single phase AC voltage controller with R load. What changes will takeplace in output voltage? **(8)**

   b) Analyse the output waveform of a single phase a.c. regulator (Converter) into various harmonics with fourier series and find the expression for the magnitude of nth harmonic, E_{nm} and its phase ϕ_n. **(8)**

OR

1. a) What are the steps involved in determining the output voltage waveforms of three phase bidirectional controllers. **(8)**

   b) What is the control range of the delay angle for single phase unidirectional controller. **(8)**

Unit - II

2. a) Draw and explain the control circuit block diagram for a cycloconverter with non circulating current. **(8)**

   b) What is a load commutated cycloconverter? How does it differ from line commutated cycloconverter? **(8)**

OR

2. a) Discuss why a 3φ to 1φ cycloconverter requires positive and negative group phase controlled converters. Under what conditions, the group works as inverter or rectifier. **(8)**

    b) What are the advantages and disadvantages of a cycloconverter? **(8)**

Unit - III

3. a) Explain 120° mode of operation of V.S.I. Compare V.S.I. and C.S.I. with respect to their merits and demerits. **(8)**

    b) Discuss the method of harmonic reduction in inverters by PWM. **(8)**

OR

3. a) What is the need for controlling the output at the output terminals of an inverter? Also, Discuss briefly and compare the various methods employed for the control of output voltage of inverters. **(8)**

    b) A 3φ bridge inverter is operated in 180° conduction mode. Draw the output line voltage waveform and obtain fourier series for the line voltage. **(8)**

Unit - IV

4. a) What are the advantages and disadvantages of resonant inverters with bidirectional switches. **(8)**

    b) What are the methods for voltage control of series resonant inverters. **(8)**

OR

4. a) What is class E resonant inverter. **(8)**

    b) What are the advantages and limitations of zcs and zvs converters. **(8)**

Unit - V

5. a) Discuss the comparative analysis of flyback and forward converter in detail. **(8)**

    b) What is conditioning of power factor? Discuss multistage converter used for conditioning of power factor. **(8)**

OR

5. a) What are the elements of SMPS ? Discuss its advantages and disadvantages.
(8)

   b) Discuss the operation of bidirectional AC power supplies.
(8)

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6E6075

6E6075

B.Tech. VI Semester (Main & Back) Examination, April/May-2017
Electrical & Electronics Engg.
6EX6.1A Smart Grid Technology
EE,EX

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitable be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.*

Unit-I

1. a)   Define smart grid. Differentiate between conventional grid and smart grid.

    b)   Explain the concept of Resilient and self-healing grid.

OR

1. a)   Describe the opportunities and challenges relate to smart grid.

    b)   What are the major points which are the forced drivers for demanding smart grid?

Unit-II

2. a)   What is smart substation? Explain the classification of smart substation.

    b)   Explain Energy management system in detail.

OR

2. a)   Explain the principle and operation of phase shifting transformer.

    b)   Describe volt/VAR control in smart grid.

Unit-III

3. a)   Explain how smart meter can be play an important role to make a system smart.

    b)   What are the protocols and benefits of Advanced Metering Infrastructure (AMI)?

OR

3. a) What is phasor measurement unit? Explain its features and applications of PMU in power system.

   b) Give the brief description of Intelligent Electronic Devices (IED).

Unit-IV

4. a) Describe the power quality issues of grid connected renewable energy resources.

   b) Explain ElectroMagnetic Compatibility (EMC). What is the importance of voltage quality to achieve EMC?

OR

4. a) Illustrate power quality monitoring concept and also explain monitoring considerations.

   b) Explain the concept of power quality conditioners related to smart grid.

Unit-V

5. a) Explain in detail about the cyber security for smart grid.

   b) Describe IP based protocols.

OR

5. Write a short note on :

   a) Cloud computing

   b) LAN and WAN

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6E6077

6E6077

B.Tech. VI Semester (Main/Back) Examination, April/May-2017
Elect. Engg.
6EX6.2A Power System Instrumentation
EE, EX

Time : 3 Hours   Maximum Marks : 80
                                      Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **five questions**, selecting **one question** from **each unit**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitable be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Unit-I

1. a) Define the following for Gaussian distribution of data :   (8)

     i)   Precision index

     ii)   probable error

     iii)   Standard deviation of mean

     iv)   Standard deviation of standard deviation

   b) Define the limiting (guarantee) errors. Derive the expression for relative limiting error.   (8)

(OR)

1. a) Define Gaussian error curves and probable error.   (8)

   b) Describe various types of errors and explain combination of errors.   (8)

Unit-II

2. a) Derive the expression for the gauge factor of strain gauges. Give the constructional details of a strain gauge.   (8)

   b) Explain the construction and working principle of seismic accelerators with suitable examples.   (8)

(OR)

2. a) What are different selection criteria for proper transducer? Explain the input, output and transfer characteristics of a transducer. **(8)**

   b) Explain the construction and principle of working of a Linear Voltage Differential Transformer (LVDT). Explain how the magnitude and direction of the displacement of core of an LVDT is detected. **(8)**

Unit-III

3. a) Explain the working principle of function generator along with a block diagram. Discuss the general features of a function generator. **(8)**

   b) Explain the construction and working of frequency to voltage converters along with a suitable diagram. **(8)**

(OR)

3. a) Explain the circuit diagram of instrumentation amplifier and also discuss the applications, merits and demerits. **(8)**

   b) Write short notes on : **(8)**

   i) Shielding

   ii) Grounding

   iii) Sample and hold circuit

Unit-IV

4. a) Explain the industrial metering and various types of industrial tariffs. **(8)**

   b) Discuss the constructional details of a single phase induction type energy meter. Discuss the different errors and their compensation in single phase energy meter. **(8)**

(OR)

4. a) Write short notes on : **(8)**

   i) Ratiometer type frequency meter

   ii) Saturable core type frequency meter

   b) Define power factor. Explain causes of low power factor and methods of improvement of power factor. Explain the method of measurement of power factor. **(8)**

Unit-V

5. Write short notes on any **two** : (8+8)

   a) Capacitive voltage transformer

   b) Transient performance of CT.

   c) Wilson compensation method for reduction of error in CT

   d) Protection circuit of CT

   e) Major sources of errors in CT

(8+8)

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6E3111

6E3111

B.Tech. VI Semester (Back) Examination, April-May, 2017
Electrical & Electronics Engg.
6EX3(O) Protection of Power System
EE, EX

Time : 3 Hours   **Maximum Marks : 80**

Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **five** questions, selecting **one** question from **each** unit. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitable be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Unit-I

1. a) Explain functional characteristics of a relay with suitable diagram.   (8)

   b) Define zone of protection, primary and back up protection.   (8)

OR

1. a) What are current transformers? Discuss transient errors available in CT.   (8)

   b) Explain steady state ratio and phase angle errors in PTs.   (8)

Unit-II

2. Discuss the following parameters for over current relays -   (16)

   a) Instantaneous time

   b) Definite time

   c) Inverse time

   d) Time and current Grading

OR

2. Give brief description of over current protective schemes for a feeder.   (16)

Unit-III

3. a) Differentiate between differential and percentage differential protection. **(8)**

    b) Discuss unbalanced stator currents. **(8)**

OR

3. a) Explain the mechanism of Rotor protection against excitation and prime mouer failure. **(10)**

    b) Define field earth fault. **(6)**

Unit-IV

4. a) What is Buchholz relay. Discuss its working with suitable diagram. **(8)**

    b) What do you mean by percentage differential protection. **(8)**

OR

4. Discuss the following parameters for Bubar protection- **(16)**

    a) High impedance relay scheme

    b) Frame leakage protection

Unit-V

5. a) Explain the working of induction cup type reactance and mho relays. **(8)**

    b) List out the faults and abnormal operating conditions for induction motor. **(8)**

OR

5. Discuss the construction, operating principle and characteristics of an electromagnetic impedance relay. List out the effects of arc resistance. **(16)**

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6E3113

6E3113

B.Tech. VI Semester (Back) Examination, April/May-2017
Electrical & Electronics Engg.
6EX5(O) Data Structures in C
EE,EX

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitable be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Unit-I

1. Define and explain following notations for complexity :　　　　　　　**(16)**

   a)　Big oh

   b)　Omega

   c)　Theta

   Also discuss their significance

(OR)

1. Write 'C' code to create nodes of singly, doubly and circular link lists.　　**(16)**

Unit-II

2. What is sparse matrices? How it can be represented as an array. Also discuss different forms of a sparse matrix　　　　　　　　　　　　　　**(16)**

(OR)

2. Write a 'C' program to check whether the string is palindrome or not.　　**(16)**

Unit-III

3. a)　What is stack data structure. Explain its applications.　　　　　　**(6)**

   b)　Write an Algorithm for infix to prefix conversion using stack.　　　**(10)**

(OR)

3. Write a 'C' program for decimal to binary conversion using stack.　　　**(16)**

Unit-IV

4. a) Create an AVL search tree from given set of values :   (8)

      H, I, J, B, A , E, C, F, D, G, K, L

   b) Create a Binary search tree by inserting following numbers :   (8)

      40, 25, 70, 22, 35, 60, 80, 90, 10, 30

(OR)

4. Write a program to implement Binary search Tree and pre order traversal in 'C'.

                                            (16)

Unit-V

5. a) Write and explain kruskal's algorithm (Minimum spanning tree).

   b) Write and explain prim's Algorithm (Minimum spanning tree).   (2×8)

(OR)

5. a) Sort following numbers using insertion sort Algorithm.   (8)

      13, 4, 18, 25, 10, 16

   b) Explain quick sort with the help of suitable example.   (8)