

6E 6071

Roll No. _____

[Total No. of Pages : 3]

6E 6071

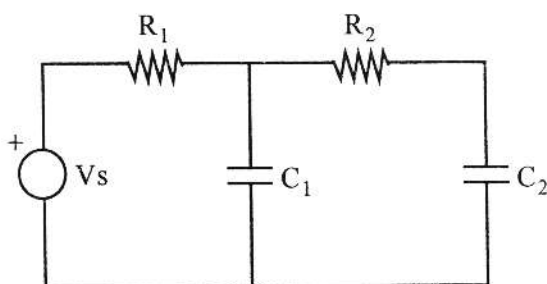
B.Tech. VI Semester (Main&Back) Examination, April - 2019
Electrical & Electronics Engg.
6EX1A Modern Control Theory
(Common with EE, EX)

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 suitably be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.

Unit - I

1. a) What do you understand by the concept of linear dependency? Are the following vectors linearly dependent? If so, express these as a linear combination form:
 $X_1 = (1, 1, 1, 3)$, $X_2 = (1, 2, 3, 4)$, $X_3 = (2, 3, 4, 9)$ (8)
- b) Write the state equation for the circuit shown below: (8)

**(OR)**

1. a) Write short note on following:
- i) Relaxedness
 - ii) Causality (8)
- b) Define the concept of state, state variables, state vector and state space. Also compare the modern versus conventional control theory. (8)

Unit - II

2. a) Express the following transfer function in state model:

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

- b) Construct signal flow graph and state model for a system whose transfer function

$$\text{is : } \frac{y(s)}{x(s)} = \frac{s^2 + 3s + 3}{s^3 + 2s^2 + 5s + 1} \quad (8)$$

(OR)

2. a) Construct the state model for a system characterized by the differential equation
 $\ddot{y} + 6\dot{y} + 11y + 6 = u$ (8)

- b) Consider a single input single output system whose state variable description is given by

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -12 & -8 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 8 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

Determine the transfer function. (8)

Unit - III

3. a) Find the Eigen values and Eigen vectors of the matrix $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$. (8)

- b) Describe pole placement concept using state feedback. (8)

(OR)

3. a) Consider the state equation $\begin{bmatrix} \dot{x}_1(t) \\ \dot{x}_2(t) \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} \begin{bmatrix} x_1(t) \\ x_2(t) \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$ obtain the state transition matrix. (8)

- b) Write a short note on controllability and observability. (8)

558

Unit - IV

4. a) Explain sampled data control system. (8)
- b) Find the z-transform of the following function $f(k) = k + \sin 2k$; $k \geq 0$ (8)

(OR)

4. a) Define z-transform. Explain 'z' and 's' domain relationship. (8)
- b) Write a short note on Initial value theorem and final value theorem of 'z'-transform. (8)

Unit - V

5. a) Write a short note on digital PID controllers. (8)
- b) Write a short note on stability in 'z'-plane. (8)

(OR)

5. a) Write a short note on adaptive control. (8)
- b) Write a short note on bilinear transformation. (8)
-

6E 6072

Roll No. _____

[Total No. of Pages : 2]

6E 6072**B.Tech. VI Semester (Main&Back) Examination, April - 2019****Electrical Engineering****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 suitably be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) What is Treeing and Tracking phenomenon in solid dielectrics? Explain. (8)
- b) How does breakdown takes place in liquid dielectric? Explain the process with the help of suspended particle mechanism. (8)

(OR)

1. a) Explain the process of breakdown in electro-magnetic gases. (8)
- b) What are the applications of gases in power system? Explain them with suitable examples. (8)

Unit - II

2. a) What is Klydonograph? Explain its working in detail. (8)
- b) Explain the working of Mark's multistage impulse generator. (8)

(OR)

2. a) How very high AC voltage is produced by using cascade transformer? Explain. (8)
- b) Explain the basic principle of potential dividers. Briefly explain Resistive and Capacitive voltage dividers. (8)

Unit - III

3. a) How can the resistivity of a dielectric be measured? What are dielectric constant and loss factor? Explain. (8)
- b) Explain basic wide-band and narrow band PD detection circuits. (8)

(OR)

3. a) Explain the working of high voltage Schering Bridge. (8)
b) How does partial discharge takes place? Draw and explain partial discharge equivalent circuit. (8)

Unit - IV

4. a) Explain the phenomenon of travelling waves in open-end and short circuited line. (8)
b) What is Simpson's theory of charge accumulation in thunder clouds? (8)

(OR)

4. a) Explain attenuation and distortion of travelling waves. (8)
b) Explain refraction of travelling wave when line is terminated through a capacitance. (8)

Unit - V

5. a) Explain volt-time curves with proper sketches. Why they are needed? (8)
b) Explain various problems associated with insulation coordination. (8)

(OR)

5. Write short notes (on any two). (2×8=16)

- i) Ground rods and counter poise.
 - ii) Expulsion type lightning arrestor.
 - iii) Rod gap and arcing horn.
 - iv) Non-linear gap type lightning arrestor.
-

6E 6073

Roll No. _____

[Total No. of Pages : 2]

6E 6073

B.Tech. VI Semester (Main&Back) Examination, April-2019
Electrical & Electronics Engg.
6EX3A Switchgear & Protection
(Common with 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 suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly).

Unit - I

1. a) Explain static Relays also state its merits and demerits. (08)
- b) Explain the concept of Duality between amplitude and phase comparators. (08)

(OR)

1. a) Explain the working phenomena of static over current relay. (08)
- b) Describe the working concept of inverse time over current relay. (08)

Unit - II

2. a) By help of neat diagram explain the concept of static MHO Relay. (08)
- b) Explain static differential protection of generator. (08)

(OR)

2. a) Explain the static differential relay for single phase schemes. (08)
- b) Describe the working concept of static impedance relay. (08)

Unit - III

3. a) Explain basic apparatus and scheme of power line carrier system. (08)
- b) Describe out of step tripping and blocking relays. (08)

(OR)

3. a) Explain the principle of operation of directional comparison. (08)
- b) Explain in brief the concept of quadrilateral and Elliptical relay. (08)

Unit - IV

4. a) For a 132KV system, the reactance and capacitance up to the location of the circuit breaker is $3\ \Omega$ and $0.015\ \mu\text{F}$, respectively. Calculate the following
- i) The frequency of transient oscillation
 - ii) The max. value of restriking voltage across the contacts of the circuit breaker.
 - iii) The max. value of RRRV. (08)
- b) Explain the Miniature Circuit Breaker (08)

(OR)

4. a) By help of neat diagram explain working of minimum oil circuit breakers. (08)
- b) Explain the Arc and Interruption theories. (08)

Unit - V

5. a) Explain the working module of SF_6 circuit breaker. (08)
- b) Explain transmission line distance protection. (08)

(OR)

5. a) By help of suitable diagram explain working framework of vacuum circuit breakers. (08)
- b) Describe a brief description of block diagram of digital relay. (08)
-

6E 3111

Roll No. _____

[Total No. of Pages : 2]

6E 3111

B.Tech. VI - Semester (Back) Examination, April-2019
Electrical And Electronics Engineering
6EX3(O) Protection Of Power System
Common with 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 suitably be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) Explain what you understand by primary and back-up protection. What is the role of back-up protection? What are the various methods of providing back-up protection? (2+2+4=8)
- b) Describe the transient errors in current transformer. (8)

(OR)

1. a) Describe the trip circuit operation in a circuit breaker with the help of neat diagram. (8)
- b) Define and explain the following:
- i) Sensitivity of relay and reliability of relay. (4)
- ii) Stability of protective system. (4)

Unit - II

2. a) Describe the construction and working principle of induction disc type over current relay. (8)
- b) The current rating of a relay is 3A. PSM is 1.0. C.T ratio is 300/3, fault current is 3000A. Find the operating time of the relay for a TMS (Time Multiplier Setting) = 0.3. (8)

At TMS=1, the operating time at various PSM are:

PSM	2	4	6	7	8	10
Operating time(S)	8	6	5	3	2.8	2.4

(OR)

2. a) Describe the principle of a directional overcurrent relay? How does it helps in discrimination parallel feeders and ring mains? (4+4=8)
- b) What do you mean by IDMT (Inverse Definite Minimum Time) over current relay? Why IDMT relays are widely used for overcurrent protection.?(3+5=8)

Unit - III

3. a) Draw the schematic diagram for percentage differential relay protection scheme for star connected generator and explain its working. (8)
- b) Briefly describe the protection scheme of excitation and prime mover failure with regard to generator rotor protection? (8)

(OR)

3. a) Describe the protection scheme generally employed for generator stator overheating. (8)
- b) Why restricted earth fault protection is provided to alternators though it leaves a portion of winding unprotected against earth fault justified? (8)

Unit - IV

4. a) Describe the scheme of percentage differential protection of transformer. (8)
- b) What is the frame leakage protection of busbar? Discuss its principle and field of application. (3+5=8)

(OR)

4. a) Draw and explain the construction and working of Buchholz relay. Against which fault Buchholz relay gives the protection? State its advantages and disadvantages. (4+1+3=8)
- b) With a neat diagram, discuss the differential protection scheme for busbar.(8)

Unit - V

5. a) Explain the three stepped distance protection of a transmission line? (5)
- b) Enumerate the abnormal conditions and faults generally experienced on induction motors. (5)
- c) Explain the points to be considered while selecting a fuse. (6)

(OR)

5. a) Describe the construction and principle of operation of electromagnetic impedance relay. (8)
- b) Write short note on:
- i) Negative Sequence relay. (4)
- ii) Induction cup type reactance relay. (4)

6E6074

Roll No. _____

[Total No. of Pages : 2]

6E6074

B.Tech. VI-Semester (Main&Back) Examination, April-2019
Electrical & Electronics Engg.
6EX4A Advanced Power Electronics
Common with 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 suitably be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) Deduce the expression of Average output voltage and rms value of output voltage for single phase full-wave controller. (8)
- b) A single phase full wave ac voltage controller feeds a load of $R = 20\Omega$ with an input voltage of 230v, 50Hz. Firing angle for both thyristors is 45° . Calculate
 - i) rms value of output voltage
 - ii) Load power and input p.f.
 - iii) Average and rms current of thyristors. (8)

(OR)

1. a) Explain the principle of integral cycle control of AC voltage controllers with suitable diagram and deduce the rms output voltage expression. (10)
- b) What is the principle of phase control in AC voltage controller? (6)

Unit - II

2. a) Draw and explain the single-phase to single-phase step-down cycloconverter. (8)
- b) A single phase bridge type cycloconverter has input voltage of 230v, 50Hz, and load of $R = 10\Omega$, output frequency is one-third of input frequency. For a firing angle delay of 30° , calculate
 - i) rms value of output voltage,
 - ii) rms current of each converter (8)

(OR)

2. Explain the working principle of three phase full wave cycloconverter for three phase output with all the suitable circuit diagram and waveforms. (16)

Unit - III

3. a) Explain the operation of 3-phase bridge inverter for 120° mode of operation with suitable diagram. (8)
- b) For a single phase full bridge inverter, $V_s = 230\text{V}$, $T = 1\text{ms}$. The RLC series load consists of $R = 1\Omega$, $WL = 6\Omega$ and $\frac{1}{\omega C} = 7\Omega$
- i) Sketch load voltage waveform V_o , fundamental component of load current i_o and source current
- ii) Find power delivered to the load due to fundamental component. (8)

(OR)

3. a) Explain the Fourier analysis of single-phase inverter output voltage. (8)
- b) Explain the quality analysis parameter for inverter. (8)

Unit - IV

4. a) What is ZVS resonant converters? (8)
- b) Explain the class E resonant inverters in details. (8)

(OR)

4. a) Explain the principle of external control of AC output voltage for inverter. (8)
- b) Explain the methods of Harmonic Reduction in the inverter output voltage. (8)

Unit - V

5. a) Explain the working principle of bidirectional AC power supply. (8)
- b) Discuss the operation of DC switch-mode power supplies. (8)

(OR)

5. a) Discuss the half bridge and full bridge converters in details. (8)
- b) Explain working of bidirectional power supplies. (8)
-

6E 3113

Roll No. _____

[Total No. of Pages : 2]

6E 3113

B.Tech. VI - Semester (Back) Examination, April-2019
Electrical & Electronics Engineering
6EX5(O) Data Structures in C
(Common with 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 suitably be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.*

UNIT-I

1. Explain any four of the following terms along with their significance: (16)
- i) Theta notation
 - ii) Big Oh notation
 - iii) Data dictionary
 - iv) Complexity
 - v) Circular linked List

(OR)

1. Write a C program to create a doubly linked list With N nodes. Also differentiate array and linked list with pros and cons of each. (16)

UNIT-II

2. a) What do you mean by Row and column major formats? Explain with example. (8)
- b) Write a C program to transpose a matrix. (8)

(OR)

2. Write a C program to multiply two matrices and store the result in third-one. Print the appropriate message if multiplication is not possible. (16)

UNIT-III

3. a) Write the algorithm of push and pop operation using Array. (8)
- b) Write a program to implement STACK & QUEUE using Linked List. (8)

(OR)

3. a) Convert following expressions Infix to Postfix. (8)
- i) $A * B / C \wedge D - E / F \wedge G * H$
- ii) $(A - B \wedge C) / D + (E * F + G)$
- b) Write an algorithm to evaluate the Postfix expression. (8)

UNIT-IV

4. a) Define the complete, almost complete and strictly binary tree with example. Also draw the suitable diagrams if necessary.
- b) Write a program to insert nodes in BST. (16)

(OR)

4. a) A Binary tree T has 9 nodes. The In-order and Pre order traversals of T yield the following sequence of the nodes: (8)
- In-order: 1, 2, 3, 4, 5, 6, 7, 8, 11
- Pre-order: 6, 1, 5, 3, 2, 4, 11, 8, 7
- Find the Binary Search Tree.
- b) Insert the following numbers in Height Balance Tree (AVL Tree) use applicable rotation if needed. (8)
- 12, 16, 17, 18, 3, -2, -6, 1, 3, 4, -5, -4

UNIT-V

5. What do you mean by spanning tree and Minimum Spanning Tree(MST), Create all possible spanning trees and find out MST among them for the given connected graph (Figure: G1): (16)

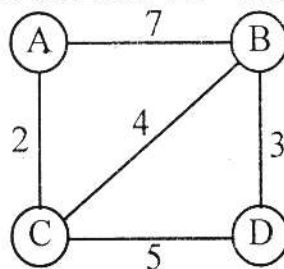


Figure: G1

(OR)

5. Explain any two of the following algorithms: (16)
- a) Bubble
- b) Merge Sort
- c) Selection
- d) Insertion

6E 6075	Roll No. _____	[Total No. of Pages : 2]
	6E 6075	
	B.Tech. VI-Semester (Main & Back) Examination, April-2019 Electrical & Electronics Engg. 6EX6.1A Smart Grid Technology (Common with 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 suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

Unit - I

1. Explain the evolution, concept, definition and need of smart grid. Also explain the benefits of smart grid. (16)

(OR)

1. Explain:
 - a) Difference between conventional and smart grid (08)
 - b) Concept of Resilient and Self Healing Grid. (08)

Unit - II

2. Explain in context with smart grid technology
 - a) Transmission systems (08)
 - b) EMS, FACTS and HVDC (08)

(OR)

2. Explain:
 - a) Volt/Var Control (08)
 - b) PHEV (08)

Unit - III

3. Explain:

a) Advanced Metering Infrastructure (AMI) drivers. (08)

b) AMI protocol. (08)

(OR)

3. Explain:

a) PMU (08)

b) IED (08)

Unit - IV

4. Explain:

a) Power quality and EMC in smart grid. (08)

b) Power quality issues of grid connected renewable energy sources. (08)

(OR)

4. Explain:

a) Web based power quality monitoring (08)

b) Power quality conditioners for smart grid. (08)

Unit - V

5. Explain the followings in context with high performance computing for smart grid applications.

a) LAN (08)

b) WAN (08)

(OR)

5. Explain the followings in context with the high performance computing for smart grid applications:

a) Cyber security for smart grid (08)

b) Web service and cloud computing for smart grid. (08)

6E 6077

Roll No. _____

[Total No. of Pages : 2]

6E 6077

B.Tech. VI-Semester (Main & Back) Examination, April-2019
Electrical & Electronics Engg.
6EX6.2A Power System Instrumentation
(Common with 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 suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly).*

Unit - I

1. a) Ten measurement of the resistance of a resistor gave $101.2\Omega, 101.7\Omega, 101.3\Omega, 101.0\Omega, 101.5\Omega, 101.3\Omega, 101.2\Omega, 101.4\Omega, 101.3\Omega$ and 101.1Ω . Assume that only random errors are present.

Calculate: (08)

- The arithmetic mean
 - The standard deviation of the reading
 - Probable error
- b) What is the difference between accuracy and precision, also List four source of possible error in instruments? (08)

(OR)

1. a) A set of independent current measurement was taken by six observers and recorded as $12.8\text{ mA}, 12.2\text{mA}, 12.5\text{mA}, 13.1\text{mA}, 12.9\text{mA}$ and 12.4mA .

Calculate: (08)

- The arithmetic mean
 - The deviation from the mean
- b) Describe the following for theory of errors.
- Combination of errors
 - Limits of error (08)

Unit - II

2. a) Explain construction and operating characteristics of digital transducers. (08)
- b) Explain Construction and working principle of Linear Variable Differential Transformer (LVDT) in detail. (08)

(OR)

2. a) Describe Construction of a strain gauge also derive expression for it. (08)
- b) Explain the working of a transducers which can measure the temperature. (08)

Unit - III

3. a) Explain a magnetic isolators. (08)
- b) Describe Shielding and grounding. (08)

(OR)

3. a) By help of neat block diagram explain construction and working of function generator. (08)
- b) Explain working phenomena of frequency to voltage converters. (08)

Unit - IV

4. Explain briefly the phenomena of energy meters and multipart tariff meters, with its advantages and application. (16)

(OR)

4. a) What do you understand by Active and Reactive power with reference to power plants? (08)
- b) Explain a basic idea of LT and HT panels. (08)

Unit - V

5. a) By help of neat diagram explain construction and working of a capacitive voltage transformers. (08)
- b) Explain composite errors and transient response. (08)

(OR)

5. a) Explain the concept of Current Transformers, use for measurement and for protection. (10)
 - b) Describe the transient behavior of capacitive voltage transformer. (06)
-