

Roll No. _____

6E 6071

6E6071

B.Tech. VI Semester (Main/Back) Examination, May-June 2015

Electrical Engineering
6EE1A Modern Control Theory
(Common for EE, EX)

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

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. Give concept of linear vector space. Describe state model of linear systems.

(16)

OR

1. Derive state model of mechanical system given in Fig. 1

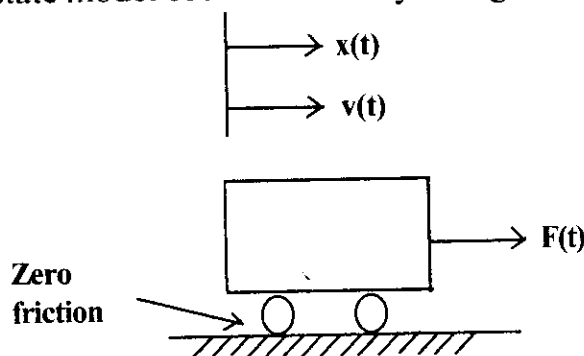


Fig. 1 Mechanical system

Take $z_1(t)$ and $z_2(t)$ as new variables given by

$$z_1(t) = 2x(t) + v(t)$$

$$z_2(t) = x(t) + v(t)$$

Write state equations for $z_1(t)$ & $z_2(t)$.

(16)

Unit - II

2. a) Differentiate between physical & phase variables. (6)
 b) For a transfer function given below, write state equations,

$$T(s) = \frac{Y(s)}{U(s)} = \frac{b}{s^n + a_1s^{n-1} + \dots + a_{n-1}s + a_n} \quad (10)$$

OR

2. a) Describe Jordan canonical form in detail. (6)
 b) Consider the transfer function

$$\frac{Y(s)}{U(s)} = \frac{b_0s^3 + b_1s^2 + b_2s + b_3}{s^3 + a_1s^2 + a_2s + a_3}$$

Derive state space equations. (10)

Unit - III

3. a) Define eigen values. Describe properties of state transition matrix. (12)
 b) Describe controllability. (4)

OR

3. a) For a matrix A given as,

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 3 & 0 & 2 \\ -12 & -7 & -6 \end{bmatrix}$$

Prove that $\Lambda = M^{-1}AM$

Where Λ is a diagonal matrix with eigen values of A as its diagonal elements. (12)

- b) Describe state transition matrix. (4)

Unit - IV

4. a) Describe how signal is reconstructed from sampled data signal. (8)
 b) Describe z - transfer function. Define properties of one sided z - transform. (8)

OR

4. a) Define sampled data control system. (4)

b) Complete the following table,

	F(s)	F(z)	
(1)	1/s	?	
(2)	?	$\frac{Tz}{(z-1)^2}$	
(3)	$\frac{1}{s^3}$?	
(4)	$\frac{1}{(s+a)^2}$?	
(5)	?	$\frac{z(1-e^{-aT})}{(z-1)(z-e^{-aT})}$	
(6)	$\frac{w}{s^2+w^2}$?	
(7)	$\frac{s+a}{(s+a)^2+w^2}$?	
(8)	$\frac{1}{s+a}$?	(12)

Unit - V

5. What do you mean by stability criterion. Describe Jury stability criteria in detail. (16)

OR

5. Write short notes on :

- a) Digital PID controller
- b) Adaptive control. (16)

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6E6072**6E 6072****B.Tech. VI Semester(Main/Back) Examination, May-June 2015****Electrical Engineering****6EE2A High Voltage Engineering****Time : 3 Hours****Maximum Marks : 80****Min. Passing Marks : 24****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 thermal ionization in gases at high temperatures and applications of gases in power system. (8)
- b) Explain phenomenon of electrical conduction in liquids. On what factors breakdown strength depends in liquid breakdown. (8)

OR

1. a) Explain "Treeing and Tracking breakdown" in solids (8)
- b) Explain suspended solid particle mechanism in liquids. (8)

Unit - II

2. a) Explain marx circuit configuration for multistage impulse generation. (8)
- b) Explain cock-roft walton circuit for high voltage DC voltage. (8)

OR

2. a) Explain cascaded transformers method for AC voltage generation. (8)
- b) Explain capacitance potential divider for compensated matching and damped capacitance divider for simple matching. (8)

Unit - III

3. a) Explain phenomenon of partial discharges and draw equivalent circuit for a typical partial discharge. (8)
- b) Explain the working of basic wide-band partial discharge measuring circuit. (8)

OR

3. a) Describe the shunt arrangement for measurement of large capacitance. (8)
- b) Show dissipation factor due to conduction loss alone is inversely proportional to the frequency with regard to dielectric loss. (8)

Unit - IV

4. a) Describe the wilson's theory for explanation of charge formation in thunder cloud. (10)
- b) Describe the typical characteristics of lightning stroke. (6)

OR

4. a) A surge of 100 kilovolt travelling in a line of natural impedance 600 ohms arrives at a junction with two lines of impedances 800 ohms and 200 ohms respectively. Find the surge voltages and currents transmitted into each branch line. (10)
- b) Why overhead line is terminated near a substation by connecting the station equipment to the overhead line through a short length of underground cable. (6)

Unit - V

5. Explain Expulsion type lightning arrester working by drawing the neat figure and also explain purpose of surge absorbers and ground wires with figures. (16)

OR

5. Describe the statistical methods for insulation coordination by representing overvoltage distribution in the form of probability density function and the insulation breakdown probability by the cumulative distribution function. **(16)**
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Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

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 mean by amplitude comparator and phase comparator? Prove the duality between them with the help of phasor diagrams. (10)
- b) What are the advantages and limitations of static relay. (6)

OR

1. a) Explain how inverse - time overcurrent relay is different in operation from definite - time over current relay with neat ckt. diagrams. Explain the working of inverse time over current static relay. (10)
- b) Explain directional static over current relay. (6)

Unit - II

2. a) What do you mean by 3 ϕ scheme of percentage differential relay with their characteristics. Explain in detail. (10)
- b) Explain static impedance relay, reactance relay and mho relay. (6)

10

OR

2. a) Explain the protection of a 3ϕ star-connected generator by means of a % percentage differential relay. (8)
- b) Explain in detail distance relay based on current comparison principle with neat diagram. (8)

Unit - III

3. a) Explain with the help of neat sketch the setup of carrier current relaying employed in transmission line protection. Explain utility of
- i) Line trap unit and
- ii) Coupling capacitor unit. Discuss why carrier current protection is suitable for important interconnected lines (10)
- b) Compare elliptical relays and quadrilateral relays (6)

OR

3. a) What is the effect of power swings on the performance of distance protection (8)
- b) Explain:
- i) Operation of directional comparison protection
- ii) Phase comparison carrier protection (8)

Unit - IV

4. a) Explain the terms recovery voltage, restriking voltage and RRRY. Derive an expression for restriking voltage in terms of system capacitance. (8)
- b) Classify all type of arc-interruption methods. Compare high-resistance interruptions method and low resistance interruption method & which is better. (8)

OR

4. Write selection criteria for good circuit breaker and compare the bulk oil circuit breaker, minimum oil circuit breaker, Air circuit breaker and miniature circuit breaker on following pts. points
- i) Arc quenching medium

- ii) Voltage breaking capacity
- iii) Design features
- iv) Applications and
- v) Remarks and

Explain rating of circuit breakers.

(16)

Unit - V

5. a) Explain with necessary diagram the phenomenon of current chopping in an air blast ckt Breaker. How this problem can be rectified by using resistance switching? Why mostly air blast circuit breakers are susceptible to current Chopping. (8)
- b) Describe the working principle of a vacuum circuit breaker. What are the shortcomings of a vacuum circuit breakers. (8)

OR

5. a) Explain the construction and working of SF₆ circuit breaker. Also enumerate the dielectric properties and arc quenching characteristic of SF₆ circuit breakers with their limitations. (8)
- b) Explain transmission line digital distance protection by using block diagram. What do you mean digital protection. (8)

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(11)

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(12)

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6E 6074

6E6074

B.Tech. VI Semester (Main/Back) Examination, May-June 2015

Electrical & Electronics Engineering

6EE4A Advanced power Electronics

Common for EE,EX

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 24

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 on - off control and phase angle control of $1-\phi$ Ac voltage controller with R-Load. (8)
- b) A single phase Ac voltage controller has resistive load of 10Ω input voltage $V_s = 120v$, 60Hz the delay angle of thyristor T_1 is $\alpha = \frac{\pi}{2}$ determine.
 - i) RMS value of output voltage.
 - ii) Input power factor. (4+4)

OR

1. Explain the three phase full wave controller with star connected resistive load also draw wave forms. (16)

Unit - II

2. a) Describe 3 - phase to three phase cycloconverter with relevant circuit using 18 SCRs and 36 SCRs. (10)

- b) What are the advantage of 3- ϕ bridge circuit cycloconverter over 18 - thyrister device. (6)

OR

2. a) Describe the basic working principle of single phase to single phase step down cycloconverter continuous conduction for bridge type cycloconverter. (8)

- b) Show that the fundamental RMS value of per phase output voltage of low frequency for an M - pulse converter is given by $V_{or} = V_{pn} \left(\frac{M}{\pi} \right) \sin \left(\frac{\pi}{M} \right)$. (8)

Unit - III

3. a) A single phase full bridge inverter inconnected to a dc source of V_s . resolve the o/p voltage wave shape into fourier series. (8)
- b) Explain working principle of three phase bridge inverter with 180° degree of conduction. (8)

OR

3. a) What is pulse width modulation? List the various PWM techniques, How do these differ from each other. (8)
- b) For a single pulse modulation used in inverters show that output voltage can be expressed as $V_o = \sum_{n=1,3,5}^{\infty} \frac{4V_s}{n\pi} \sin \left(\frac{n\pi}{2} \right) \sin nd \sin (n\omega t)$, where 2d is pulse width. (8)

Unit - IV

4. a) Explain working of L - type ZCS resonant converter. (8)
- b) The 2cs resonant converter deliner maximum power of $w/P_L = 400mw$ at $V_o = 4v$ the supply voltage $V_s = 12v$. The maximum operating frequency 50Hz. Determine the value of L and C assume t_1 and t_3 are very small and $x = 1.5$. (8)

OR

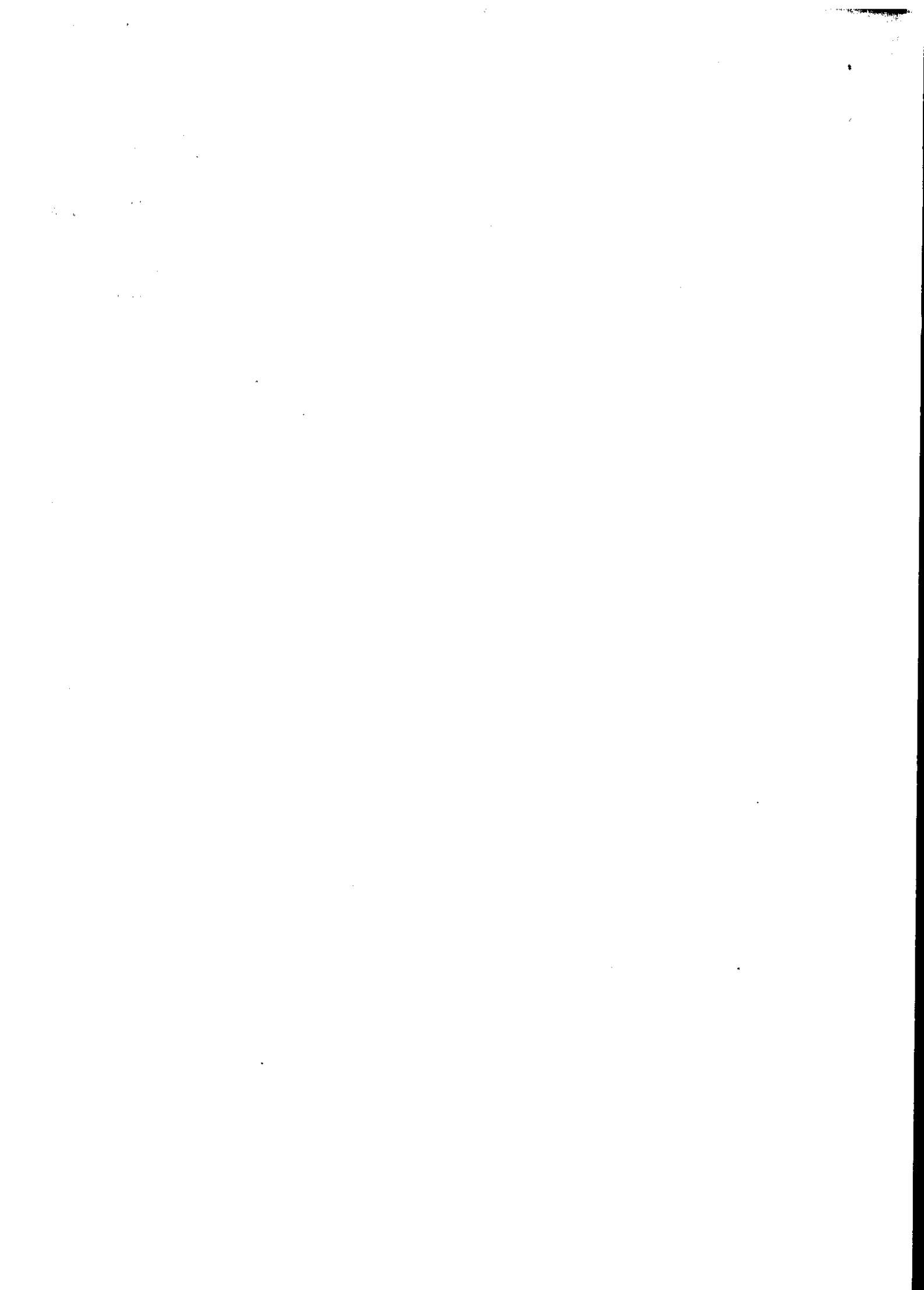
4. a) Write down short note on ZVS resonant converter. (10)
- b) Write down the advantages and Limitations of ZVS. (6)

Unit - V

5. a) Explain the control circuit of current mode control and voltage mode control. (8)
- b) write down short note on multistage conversion. (8)

OR

5. a) What is the switched mode Dc power supplies. Explain working principle of flyback converter. (8)
- b) Explain the operation of full bridge converter. (8)



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<div style="border: 1px solid black; display: inline-block; padding: 2px 10px; margin: 5px 0;">6E 6075</div> <p>B.Tech. VI Semester (Main) Examination, May-June 2015 Electrical Engineering 6EE5A Smart Grid Technology (Common for EE,EX)</p>		

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

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) Write a short note on "need of electricity"? Draw the power distribution diagram defining all three sections of power grid. (8)
- b) What are the initiatives taken by Indian economy for smart grid. (8)

OR

1. a) Differentiate the resilience grid and self healing grid. (8)
- b) Describe the opportunities and challenges relate to smart grid. (8)

Unit - II

2. a) Briefly explain the concept of plug in hybrid electric vehicle technology and it challenges. (8)
- b) What is smart substation? Describe the different types of smart substation. (8)

OR

2. a) What is distribution management system? what is the need of distribution management system in electric power distribution system? (8)
- b) Define Feeder Automation with its application. (8)

Unit - III

3. a) Explain how the smart meters can be play an important role to make a system smart. (8)
- b) What is Intelligent Electronic Device(IED)? Explain the functions of IED. (8)

OR

3. a) Explain the concept of phase measurement unit and also its applications. (8)
- b) Explain the communication network topologies used for data transmission in advanced metering infrastructure. (8)

Unit - IV

4. a) Highlight the issues related to power quality in smart grid. (8)
- b) Explain web based power quality monitoring. (8)

OR

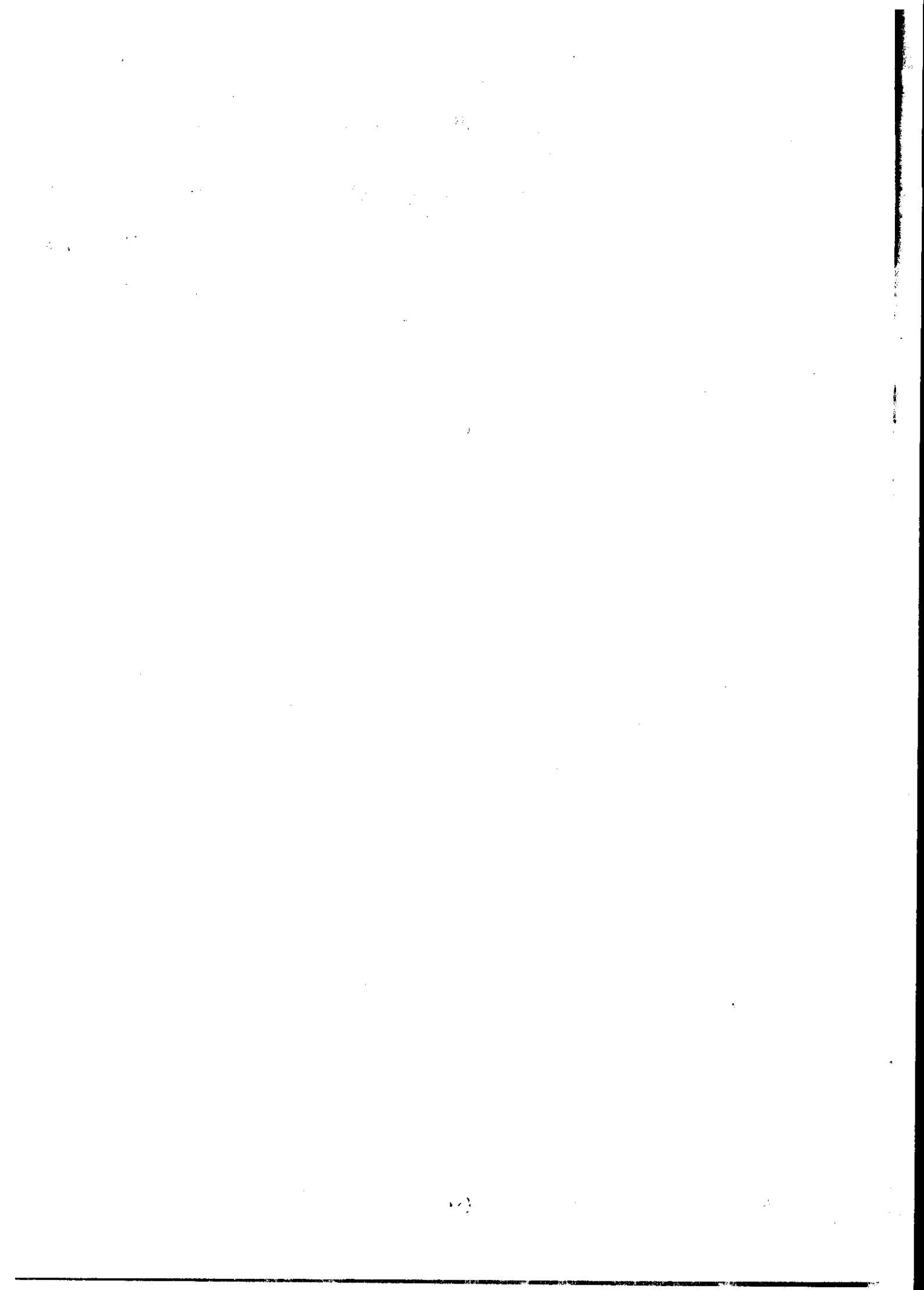
4. a) What is electromagnetic compatibility? Describe relation voltage quality and electromagnetic compatibility. (8)
- b) Describe the concept of power quality conditioners related to smart grid. (8)

Unit - V

5. a) Write a short note on cyber security for smart grid. (8)
- b) Describe IP based protocols. (8)

OR

5. a) What is Broadband over power line? Explain working and feature of broadband over power line. (8)
- b) What do you understand by 'cloud computing' Explain briefly. (8)
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6E6077

6E 6077

B.Tech.VI Semester(Main) Examination, May-June 2015**Electrical Engineering****6EE6.2A Power System Instrumentation****(Common For EE, EX)****Time : 3 Hours****Maximum Marks : 80****Min. Passing Marks : 24****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 the Instrumental errors and observational errors with suitable examples. (8)
- b) Discuss probable error of one reading and precision index for Gaussian distribution curves. (8)

OR

1. a) Explain the random errors and limiting errors with suitable examples. (8)
- b) Define the following : (8)
 - i) Standard deviation of mean
 - ii) Variance

Unit - II

2. a) A resistance strain gauge with a gauge factor of 2 is cemented to a steel member, which is subjected to a strain of 1×10^{-6} . If the original resistance value of the gauge is 130Ω . Calculate the change in resistance. (8)

- b) Explain the working of optical pyrometers. Discuss its merits and demerits also. (8)

OR

2. a) The output of an LVDT is connected to a 5 V voltmeter through an amplifier whose amplification factor is 240. An output of 2mv appears across the terminals of LVDT when the core moves through a distance of 0.5mm. Calculate the sensitivity of the LVDT and that of the whole set up. The millivoltmeter scale has 100 divisions. The scale can be read to 1/5 of a division. Calculate the resolution of the instrument in mm. (8)
- b) Explain the working of piezo electric pressure transducers with their applications (8)

Unit - III

3. a) Draw and explain the circuit diagram of frequency to voltage converters. Discuss its applications also. (8)
- b) How will you generate step, ramp and impulse wave using function generators. (8)

OR

3. a) Explain block diagram and working of isolation amplifiers with its merits and demerits. (8)
- b) How will you convert temperature to current parameters. Explain this converter with circuit diagram and their applications. (8)

Unit - IV

4. Explain the following with suitable diagrams:
- a) Measurement of frequency and phase angle. (8)
- b) Tarriff meters (8)

OR

4. a) Differentiate and explain the active power and reactive power in power plants. (8)
- b) Explain the measurement and calibration techniques of energy meters. Draw its phasor diagram also. (8)

Unit - V

5. a) Explain the effect of the following on the performance of current transformers
- i) Change of secondary circuit burden
 - ii) Change of frequency (8)
- b) Explain the transient behavior of capacitive voltage transformers. (8)

OR

5. a) Draw the equivalent circuit and phasor diagram of current transformer. Derive the expressions for ratio and phase angle errors. (8)
- b) What are the sources of errors in capacitive voltage transformers. Discuss about its precautions for minimize the various errors. (8)
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6E3086	Roll No. _____	[Total No. of Pages : 3]
6E 3086		
B.Tech. VI Semester (Back) Examination, May 2015		
Electrical and Electronics Engineering		
6EX2 (O) Microprocessor and Microcontroller		
Common for EE & EX		

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

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 are the different types of buses used in Microprocessor. Explain briefly. (8)
- b) Compare static RAM with dynamic RAM (8)

OR

1. a) Write a note on
 - i) Buffer
 - ii) Latches
 - iii) encoder
 - iv) decoder (8)
- b) What are tri state devices and why they are essential in bus Oriented system (8)

Unit - II

2. a) Explain the architecture of 8085 Microprocessor in detail (8)

- b) Explain the function of ALE and IO/\overline{M} of 8085. Explain the demultiplexing of lower order address bus and data bus. (8)

OR

2. a) Explain the hardware and software interrupt supported by 8085 (8)
 b) Explain the RISC and CISC Architecture of the processors and discuss their salient features. (8)

Unit - III

3. a) Explain the following instructions of 8085 Microprocessor by taking an example
 i) CMP
 ii) LDAX
 iii) XCHG
 iv) DAD (8)
 b) Write a program for creating a delay of 1m sec. Assume the system clock frequency of 2 MHz (8)

OR

3. a) Explain the addressing modes available in 8085 Microprocessor. (8)
 b) Write a program to find 2's complement of a number. (8)

Unit - IV

4. a) Explain the functional block diagram of 8254 programmable interval timer. (8)
 b) Explain the various operating modes of programmable peripheral interface chip 8255 (8)

OR

4. a) Draw the block diagram of 8257 DMA controller and explain the process of data transfer from peripheral to system memory (10)

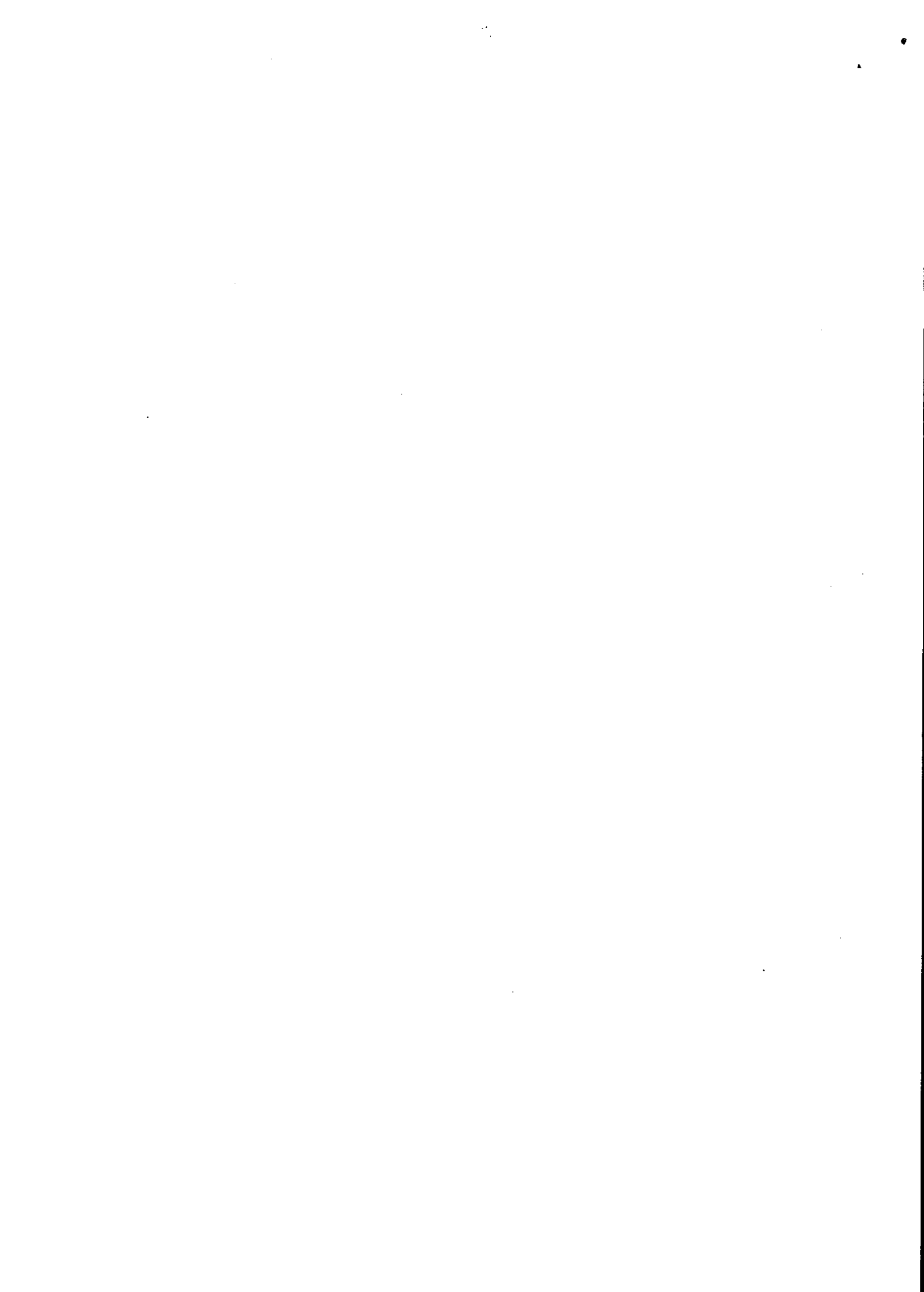
- b) Explain the matrix key board interface in 8279 (6)

Unit - V

5. a) Draw and explain the functional block diagram of 8051. (8)
b) Explain the addressing modes of 8051 with suitable Example. (8)

OR

5. a) Explain various timers and interrupts and their functions in 8051 Microcontroller. (8)
b) Explain the interfacing of LCD display with 8051 Microcontroller. (8)
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6E 3111	Roll No. _____	[Total No. of Pages : 3]
	<div style="border: 1px solid black; display: inline-block; padding: 2px 10px; margin: 5px 0;">6E 3111</div> <p>B.Tech. VI Semester(Back) Examination, May 2015 Electrical Engg. 6EE3 Protection of power system (Common for 6EE3(O) & 6EX3(O))</p>	

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

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) Describe the fault clearing process in electrical network/power system by drawing a typical relay circuit. Describe various sources of any typical power system which feed to short circuit when it occurs (04+04)
- b) Describe the protection zone concept to achieve selectivity in power system protection. Explain concept of primary and backup protection. (04+04)

OR

1. a) Draw the equivalent circuit of current transformer and phasor diagram for the same. Show how the ratio error & phase angle errors are expressed for current transformer; draw vector diagram also (04+04)
- b) Describe the desired response from measurement CT & protective CT with the help of excitation characteristic for each of these (04+04)

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Unit - II

2. a) Describe the working and principle of induction disc type over current relay
- b) Describe how the protection is given in parallel feeder and ring main by directional & non directional over current relays (10+6)

OR

2. a) A relay operates with a rated current of 5 Amp which has a relay setting of 150% (one hundred & fifty percent). It is connected to a power system through a current transformer of 400/5 ratio. If the fault current is 6000 Amp, determine the plug setting multiplier of the relay.
- b) How the directional overcurrent relay 30° and 90° connections are provided by various combinations of voltages and currents. (10+6)

Unit - III

3. a) Describe with the help of figure how the percentage differential protection for a star-connected generator is provided.
- b) Describe how the stator interturn part protection is provided in generator. (10+6)

OR

3. a) Describe how rotor earth fault protection is provided in generator
- b) Draw figures for the loss of excitation protection and unbalanced current protection for a generator rotor (10+6)

Unit - IV

4. a) Describe harmonic current restraint percentage differential relay protection in transformer protection.
- b) Describe the operating characteristics of a percentage differential relay. (10+6)

OR

4. a) Describe correct methods of selection of CT ratios for differential protection of busbars to detect:
- External fault
 - Internal fault
- (8+8)**

Unit-V

5. Draw the figures for implementation of reactance relay & mho relay using the four-pole induction cup structure, and explain the trip law for these relays using the universal torque equation. **(8+8)**

OR

5. Draw figures for phase fault and ground fault protection for induction motor protection and explain negative sequence voltage relay protection for induction motor against unbalance in supply voltage. **(8+8)**
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	<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">6E 3113</div> B.Tech. VI Semester(Main/Back) Examination, May 2015 Electrical Engg. 6EE5 Data Structures In C (Common for EE & EX)	

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

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 are the various operations performed on data structure ? Explain. (6)
- b) Write an algorithm to search an element while list is sorted. (5)
- c) Differentiate between Big oh, Omega & Theta notation (5)

OR

1. a) Write down the advantages of Linked list over arrays. (4)
- b) What do you mean by space and time complexity. (4)
- c) Define and compare static memory allocation and dynamic memory allocation (4)
- d) Write down the operations of data structures. (4)

Unit - II

2. a) Let A and B are two arrays and their size are 50 & 60 respectively. Suppose one want to keep 100 data in these arrays. But in accessing the data problems are that when one makes a search for particular data if he does not find the data in array A then goes into array B in this fashion accessing of data being very slow. Suggest remedies for this problem. (12)

- b) Derive the formulae to calculate size of Linear array. (4)

OR

2. a) Write an algorithm to concatenate two arrays A and B. Implement the designed algorithm. (8)
- b) Why binary search is more efficient than the linear search? Explain and justify (4)
- c) Explain sparse matrices (4)

Unit - III

3. a) Is it possible to implement a Queue with the help of two stacks ? justify your answer. (4)
- b) Explain how stacks are used in postponed decision. (3)
- c) Explain output restricted queue with suitable example. (5)
- d) Implement a deque with the help of linear linked list (4)

OR

3. a) Design an algorithm for a input restricted queue implement the designed algorithm. (7)
- b) List the operations that can be performed on a stack (4)
- c) Translate the following Infix expression into equivalent post fix expression
 $(x - y) * ((z + v) / f)$. (5)

Unit - IV

4. a) Construct the binary tree from the following traversal
 Sequences Preorder: F A E K C D H G B
 Inorder : E A C K F H D B G (6)
- b) Write a function that finds height of binary tree. (5)
- c) Write a recursive function to print the postfix representation of binary tree (5)

OR

4. a) Create an AVL search tree from the given
 Set of values : H,I,J,B,A,E,C,F,D,G,K,L (6)
- b) Prove that the root of a binary tree is an ancestor of every node in the tree except itself. (5)
- c) Write a function that counts number of nodes in a binary tree. (5)

Unit - V

5. a) Consider the graph G illustrated in the figure below.

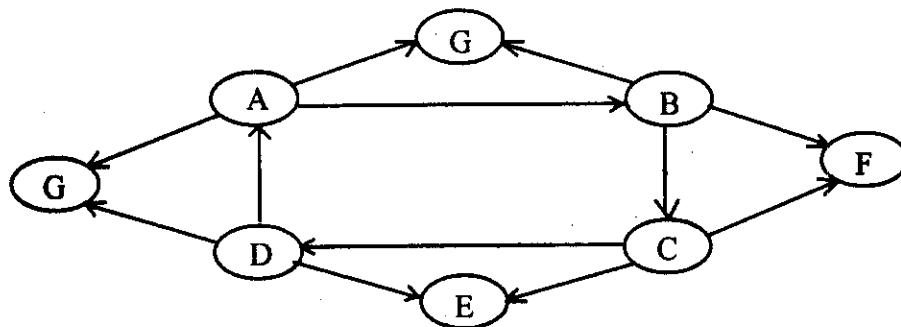


fig :G

- i) Find adjacency matrix A of the graph G (3)
 - ii) Find the depth of the graph G (3)
 - iii) Find path matrix using Warshell's algorithm. (4)
- b) Explain Kruskals algorithm using an example. (6)

OR

5. a) Draw the complete undirected graph for five vertices. Prove the number of edges in an n vertex graph is $n(n-1)/2$. (8)
- b) Explain the difference between both first and Breadth first traversing techniques of a graph. (5)
- c) For what kind of graph is the topological sorting defined? justify your Answer (3)

