



**7th Semester End Term Examination: Dec - 2022**

**Subject : Fuzzy Logic Control**

**Course : B.TECH (EEE)**

**Full Marks : 70**

**Roll No: .....**

**Time : 3 Hours.**

**Instructions to the Candidates:**

- Read the question paper very carefully.
- Start writing from 2nd page onwards; **Don't Write On The 1st Page Backside.**
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- Part-A is containing 12 multiple choice questions.
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**PART - A**

**Multiple Choice Questions**

[12x1=12]

1.i) For the given fuzzy set A, which element does not belongs to A?

$$A = \{(x1, 0.25), (x2, 0), (x3, 1), (x4, 0.5)\}$$

- a) x1
- b) x2
- c) x3
- d) x4

ii) Which of the following statement are true?

- a) As complexity of a system increase, it becomes difficult to make a precise statement about its behavior.
- b) A glass can either be full or empty.
- c) Fuzzy logic is a sub- part of classical logic.
- d) There is no degree of true or false in fuzzy logic.

iii) In 1988, Hitachi applied fuzzy logic in which of the following application?

- a) Air Conditioning
- b) Washing machine
- c) Public Transportation System
- d) Private Automobile



- iv) What are the following sequence of steps taken in designing a fuzzy logic machine?
- Rule evaluation → Fuzzification → Defuzzification
  - Fuzzification → Rule evaluation → Defuzzification
  - Fuzzy Sets → Defuzzification → Rule evaluation
  - Defuzzification → Rule evaluation → Fuzzification
- v) Assumptions in Fuzzy Logic Control (FLC) Design
- Existence of knowledge body
  - Range of precision
  - The plant is observable controllable
  - All of the above
- vi) Propositions in fuzzy logic involve
- Fuzzy predicate
  - Fuzzy Qualifier
  - Fuzzy Quantifier
  - All of the above
- vii) In this form of reasoning, the antecedent part of the rule does not contain any fuzzy quantifiers and fuzzy probabilities
- Qualitative Reasoning
  - Categorical Reasoning
  - Syllogistic Reasoning
  - Dispositional Reasoning
- viii) What Is Fuzzy Inference Systems?
- The process of formulating the mapping from a given input to an output using fuzzy logic
  - Having a larger output than the input
  - Having a smaller output than the input
  - Changing the output value to match the input value to give it an equal balance
- ix) Examples of Fuzzy quantifiers are words like
- Most
  - Many
  - Few
  - All of the above
- x) Propositions in fuzzy logic involves
- Fuzzy predicate
  - Fuzzy Quantifier
  - Fuzzy Qualifier
  - All of the above
- xi) In this mode of reasoning, the antecedents & consequents have fuzzy linguistic variables
- Qualitative Reasoning
  - Categorical Reasoning
  - Syllogistic Reasoning
  - Dispositional Reasoning
- xii) Where Has Fuzzy Inference Systems Been Implemented?
- Wireless services, heat control and printers
  - Restrict power usage, telephone lines and sort data
  - Simulink, boiler and CD recording
  - None of these

**PART - B**

**Answer any FOUR out of SIX**

[4x7=28]

- What is fuzzy logic? Describe the properties of classical sets.
- What is quantifier? What are the different types of quantifiers?
- What are the assumptions taken into consideration in designing of Fuzzy logic control? Describe it briefly.
- Differentiate between probability and fuzzy logic?
- Describe method for representing fuzzy sets and classical sets.

**PART - C**

**Answer any TWO out of FOUR**

[2x15=30]

- Describe the methods of FIS. Compare between the two methods of FIS.
- Write the steps for designing FLC.
- Write the short notes on classical set theory.
- What is adaptive fuzzy logic controller? Draw the block diagram. Describe basic steps for implementing adaptive algorithm.





**7th Semester End Term Examination: Dec - 2022**

**Subject : Digital System Design**

**Course : B.TECH (EEE)**

**Full Marks : 70**

**Roll No: .....**

**Time : 3 Hours.**

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**PART - A**

**Multiple Choice Questions**

**[12x1=12]**

- 1.i) 1. Any signed negative binary number is recognized by its \_\_\_\_\_  
a) MSB  
b) LSB  
c) Byte  
d) Nibble
2. The parameter through which 16 distinct values can be represented is known as \_\_\_\_\_  
a) Bit  
b) Byte  
c) Word  
d) Nibble
3. If the decimal number is a fraction then its binary equivalent is obtained by \_\_\_\_\_ the number continuously by 2.  
a) Dividing  
b) Multiplying  
c) Adding  
d) Subtracting
4. The output of the sequential circuit depends upon \_\_\_\_\_  
a) Present input  
b) Past input  
c) Present input and present state  
d) None of the above



5. The flip flops are categorized into \_\_\_\_\_  
 a) One  
 b) Two  
 c) Three  
 d) Four
6. Shift registers comprise of which flip-flops?  
 a) D flip-flops  
 b) SR flip-flops  
 c) JK flip-flops  
 d) T flip-flops
7. In serial input serial output register, the data of \_\_\_\_\_ is accessed by the circuit.  
 a) Last flip-flop  
 b) First flip-flop  
 c) All flip-flops  
 d) No flip-flop
8. In which flip flop the present input will be the next output?  
 a) S-R  
 b) J-K  
 c) D  
 d) T
9. The J-K flip flops has \_\_\_\_\_ memory  
 a) Temporary  
 b) Random  
 c) Nonrandom  
 d) True
10. The preset input is used to make output \_\_\_\_\_  
 a) Q=1  
 b) Q=0  
 c) Invalid  
 d) No change
11. State transition happens \_\_\_\_\_ in every clock cycle.  
 a) Once  
 b) Twice  
 c) Thrice  
 d) Four times
12. In the FSM diagram, what does the information below the line in the circle represent?  
 a) Change of state  
 b) State  
 c) Output value  
 d) Initial state

**Answer any FOUR out of SIX**

2. Convert the following Number as instructed:  
 i. Convert binary number (111)2 into decimal system.  
 ii. Convert octal number (1654)8 into decimal system
3. Explain the operation of the 4-bit asynchronous counter
4. Prove that

[4x7=28]

**PART - B**

(i)  $A.(A+B) = A$

(ii)  $A + \bar{A}.B = A + B$

(iii)  $A.B + \bar{A}.C = (A+C).(\bar{A}+B)$

5. Convert the following Number as instructed:  
 i. Convert (1654)8 into binary system.  
 ii. Convert (634.640625) to octal equivalent.
6. Explain about different types of shift registers.
7. Explain the basic concepts in state machine analysis.

**PART - C**

**Answer any TWO out of FOUR**

[2x15=30]

8. Simplify the following expressions:

(i)  $F(A, B, C) = \sum(2, 3, 5, 4)$ ,

(ii)  $F = \sum(3, 4, 6, 7)$ ,

(iii)  $F = \bar{A}C + \bar{A}B + \bar{A}\bar{B}C + BC$ ,

9. Consider a digital system for minority logic. there are three inputs a, B and C. The output Y is equal to 1 if two or three inputs are 0.

- i. Write the truth-table.  
 ii. From the truth-table obtain the Boolean expression for Y.  
 10. Explain in brief Programmable Array Logic (PAL)  
 11. What is TTL logic family and CMOS family? Which one is faster TTL or CMOS?





**7th Semester End Term Examination: Dec - 2022**

**Subject**

: Power System Protection

**Course**

: B.TECH (EEE)

**Full Marks**

: 70

**Roll No:** .....

**Time** : 3 Hours.

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**PART - A**

**Multiple Choice Questions**

[12x1=12]

- 1.i) Occurrence of which type of fault is more in power system?  
a) L-G  
b) L-L-L-G  
c) L-L  
d) L-L-L
- ii) Circuit Breaker is a  
a) Switch  
b) Measuring device  
c) Fault sensing device  
d) None of these
- iii) \_\_\_\_\_ signals circuit breaker in case of occurrence of a fault.  
a) Fuse  
b) Isolator  
c) CT  
d) Relay
- iv) Which of these is not a desirable characteristics of a protective system?  
a) Reliability  
b) Sensitivity  
c) Compactness  
d) Fast operation



- v) What will be the PSM value of an O.C. relay for a fault current of 15 A & relay pickup value of 5 A
- 4
  - 2
  - 3
  - 5
- vi) The threshold value of the actuating quantity above which the relay operates is called
- Pick up value
  - Drop out value
  - Restraining force
  - Reset time
- vii) The normal frequency rms voltage appearing between the poles of the circuit breaker after final arc extinction is called
- Restriking Voltage
  - Arc voltage
  - Rate of Rise of Restriking Voltage
  - Recovery Voltage
- viii) Which of these is a LT switchgear?
- Oil Circuit Breaker
  - Miniature Circuit Breaker
  - SF6 Circuit Breaker
  - Vacuum Circuit Breaker
- ix) For which of the following ratings of the transformer differential protection is recommended?
- Above 30 kVA
  - Equal to & above 5 MVA
  - Equal to & above 25 MVA
  - None of the above
- x) Buchholz Relay is associated with
- Generator
  - Transformer
  - Motor
  - Bus bar
- xi) SF6 is which type of gas?
- Electro positive
  - Electronegative
  - Neutral gas
  - None for these
- xii) Which of these is not a circuit breaker rating?
- Rated voltage
  - Rated Frequency
  - Rated Speed
  - Rated breaking capability

**Answer any FOUR out of SIX**

**PART - B**

**[4x7=28]**

- Explain the consequences of faults in power system?
- Discuss Distance protection.
- Elaborate about Differential Relays & their working.
- Write short note on Oil Circuit Breakers.
- Explain Restriking voltage, Rate of Rise of Restriking Voltage (RRRV) & Recovery Voltage with suitable diagram.

7. Write a short note on "Travelling Waves in transmission lines" & also mention its specifications.

**PART - C**

**Answer any TWO out of FOUR**

**[2x15=30]**

- Write a detail note on different types of Overcurrent Relays with suitable graph. Also draw its time-current characteristics.
- Explain Arc phenomena and the two modes of Arc extinction methods in details.
- Describe the operation of Hinged Armature Type Electromagnetic relay with suitable diagram.
- Compare between Fuse & Circuit Breakers.





**7th Semester End Term Examination: Dec - 2022**

**Subject** : Power System Analysis-II  
**Course** : B.TECH (EEE)  
**Full Marks** : 70  
**Roll No:** .....  
**Time** : 3 Hours.

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**PART - A**

**Multiple Choice Questions**

[12x1=12]

- 1.i) In load flow studies of a power system, a voltage control bus is specified by
- a) Real power and reactive power
  - b) Reactive power and voltage magnitude
  - c) Voltage and voltage phase angle
  - d) Real power and voltage magnitude
- ii) The Gauss-Seidel load flow method has following disadvantages, select the incorrect statement
- a) Unreliable convergence
  - b) Slow convergence
  - c) Choice of a slack bus affects convergence
  - d) A good initial guess for voltages is essential for convergence
- iii) For n bus power system size of Y bus matrix is
- a)  $(n-1) \times (n-1)$
  - b)  $(n-2) \times (n-2)$
  - c)  $n \times n$
  - d)  $(n-1) \times (n-2)$
- iv) The frequency of a particular bus can be controlled by controlling the
- a) Reactive power of bus
  - b) Active power of bus
  - c) Number of bus
  - d) Phase angle and reactive power



- v) Which of the following buses is also known as P-Q bus?
- Load bus
  - Voltage control bus
  - Slack bus
  - Generator bus

- vi) In power system, the maximum number of buses are
- Generator buses
  - Load buses
  - Slack buses
  - P-V buses

- vii) Compared to Gauss-Seidel method, Newton-Raphson method takes
- Less number of iterations and more time per iteration
  - Less number of iterations and less time per iteration
  - More number of iterations and more time per iteration
  - More number of iterations and less time per iteration

viii) Which of the following matrices reveals the topology of the power system network?

- Primitive impedance matrix
- Bus impedance matrix
- Primitive admittance matrix
- Bus incidence matrix

ix) Penalty factor in power system economic operation is measure of

- Line loss
- Generation cost
- Fuel cost
- Power delivered

x) Which of the following is considered as an operational cost for a power system?

- Fuel cost
- Insurance
- Initial cost
- Taxes and interest

xi) In which type of fault, zero sequence currents do not exist?

- Line to line
- Line-line to ground
- Line to ground
- Line-line-line to ground

xii) Power transfer capability of a transmission line is the most affected by

- Shunt conductance
- Capacitance
- Resistance
- Inductance

**PART - B**

**Answer any FOUR out of SIX**

**[4x7=28]**

- Define the terms slack bus, generator bus and load bus.
- Write the comparison between Gauss Seidel method and Newton Raphson method for load flow analysis.
- What is optimal unit commitment?
- Write a short note on power system security.
- Define the term Power system stability. What is the meaning of transient stability and steady state stability?

7. What is Swing equation? Derive and explain.

**PART - C**

**Answer any TWO out of FOUR**

**[2x15=30]**

8. For the given system and data,

- Find YBUS assuming that line shown dotted is not connected.
  - What modifications need to be carried out in the YBUS if the line shown dotted is connected?
9. Draw and explain the flow chart of Newton Raphson method for load flow solution.
10. Derive the condition for optimal operation of generators on a bus bar.
11. Two synchronous machines of equal rating have internal voltages of  $(1.1+j0.5)$  and  $(0.8-j0.4)$  pu voltage respectively. The machines are connected by a line of 50km length having only reactance and the 2nd machines receives power of 0.9 pu. Determine the reactance of the line per km length. Assume that there is no internal reactance for simplification.





**7th Semester End Term Examination: 2022-23**

**Subject**

: **EHV Power Transmission**

**Course**

: **B.TECH. (EEE)**

**Full Marks**

: **70**

**Roll No:** .....

**Time** : **3 Hours.**

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**Multiple Choice Questions**

**PART - A**

[12x1=12]

- i) Under excited Synchronous phase modifier works as
  - a) Shunt capacitor
  - b) Series capacitor
  - c) Shunt Reactor
  - d) Series Reactor
- ii) Series reactors have
  - a) Low impedance
  - b) Low resistance
  - c) Low reactance
  - d) High resistance
- iii) The topmost conductor in hv transmission line is
  - a) B-phase conductor
  - b) R-phase conductor
  - c) Y-phase conductor
  - d) Earth conductor
- iv) FACTS devices used in
  - a) Generation
  - b) DC transmission
  - c) AC transmission
  - d) None of these
- v) The power transmission capacity of a transmission line is



7. Why bundled conductors are used in transmission lines?  
PART - C  
Answer any THREE out of FIVE [3x10=30]

8. What are the various reasons to adopt EHV AC Transmission system? Also explain point wise the problems involved in EHV AC Transmission systems.
9. Write a note on 'Power Handling Capacity & line loss'. Also discuss the important points related to power handling capacity of ac transmission lines & line losses.
10. Derive the expression for "Field of Line Charges for 2-conductor line".
11. Derive the expression for electrostatic induction on energized circuit of a ac line.

b) Proportional to the square of transmission voltage  
 d) Inversely proportional to the square of transmission voltage

- vi) \_\_\_\_\_ are used to provide compensation at the receiving end of a transmission line so as to improve its voltage profile
  - a) Condensers
  - c) Reactors
- vii) When a transmission line is suddenly energised, \_\_\_\_\_ propagate on it
  - a) Voltage wave only
  - b) Current wave only
  - c) Both voltage and current waves
  - d) None of the above
- viii) When a travelling wave propagates on a transmission line, it suffers
  - a) Reflection only
  - b) Refraction only
  - c) Both Reflection & Refraction
  - d) None of these

- ix) FACTS devices in ac transmission lines will increase
  - a) System transient stability
  - b) Reliability
  - c) Power flow capacity
  - d) All of the above

- x) FACTS means
  - a) Flexible DC transmission system
  - b) Flexible AC transmission system
  - c) Flexible DC-AC transmission system
  - d) None of these
- xi) Series capacitors on transmission lines are of little use when the load VAR requirement is
  - a) Large
  - b) Small
  - c) Fluctuating
  - d) All of the above

- xii) Over excited Synchronous phase modifier works as
  - a) Shunt capacitor
  - b) Series capacitor
  - c) Shunt Reactor
  - d) Series Reactor

Answer any FOUR out of SIX [4x7=28]  
PART - B

2. Describe the different modes of propagation of travelling waves in a transmission line.
3. Write a note on "Surface Voltage Gradient on Conductors".
4. How the high electrostatic field will effect humans, animals & plants.
5. Discuss in brief the mechanical considerations in transmission line performance.
6. Discuss the mechanism of generation of Corona discharge.