6E3110

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6E3110

B.Tech. VIth Semester (Main/Back) Examination, June - 2010

Electrical Engineering

6EE2 High Voltage Engineering

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

Min. Passing Marks : 24

Instructions to Candidates:

*Attempt overall **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 may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

Unit - I

1. a) Discuss the breakdown in electromagnetic gases taking suitable example. **(8)**

   b) Describe the applications of gases in power system area. **(8)**

OR

   a) Discuss the suspended solid particle mechanism breakdown taking suitable example. **(8)**

   b) Discuss the treeing and tracking breakdown in solids in detail. **(8)**

Unit - II

2. a) Describe the basic voltage multiplier circuit for high dc voltage generation. **(8)**

   b) Discuss about the cascaded transformers for high ac voltage generation. **(8)**

OR

   a) Discuss the Mark's multi-stage impulse generator method for impulse voltage generation. **(8)**

   b) Discuss the construction and operation of sphere gap method with regards to measurement of high voltage. **(8)**

Unit - III

3. Discuss the high voltage Schering bridge for the following :-

   a) Measurement of capacitance.

   b) Measurement of dielectric loss. **(16)**

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Unit - III

3. Discuss the high voltage Schering bridge for the following :-

   a) Measurement of capacitance.

   b) Measurement of dielectric loss. **(16)**

OR

a) Discuss about the partial discharge equivalent circuit. **(8)**

b) Discuss about the partial discharge detection circuit. **(8)**

Unit - IV

4. Explain and discuss the following with regards to over voltage :-

a) Causes of over voltage.

b) Over voltage due to lighting. **(16)**

OR

Explain and discuss the following with regards to travelling waves :-

a) Travelling waves on transmission line-open end line.

b) Attenuation of travelling waves. **(16)**

Unit - V

5. Explain and discuss the following with regards to over voltage protection :-

a) Construction & operation of protection angle and protective zone.

b) Construction & operation of surge absorber and arching horn. **(16)**

OR

Explain and discuss the following with regards to insulation co-ordination :-

a) Volt-time curves.

b) Coordination of insulation levels. **(16)**

6E3113

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6E3113

B.Tech. VIth Semester (Main) Examination, June - 2010

Electrical Engineering

6EE5 Data Structures in C (Common for 6EE5 & 6EX5)

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

Min. Passing Marks : 24

Instructions to Candidates:

*Attempt overall **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 may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

Unit - I

1. a) Define the terms data structure & abstract data structure. **(4)**

   b) Write notes on the following :

   i) Big-oh notation

   ii) Recursion

   iii) Divide & conquer strategy. **(12)**

Unit - II

2 Write the algorithms for the following :

   a) Interchange the elements of position P & next (P) in a singly linked list. **(8)**

   b) Locating an element on a sorted list using Array representation. What is the running time of each of these algorithm? **(8)**

Unit - III

3. a) Write a method to convert an infix expression to postfix notation. Show these steps to convert the following expression to postfix form.

   $(3**2*5)/(3*2-3)+5$ **(8)**

   b) Write down the algorithm to implement two stacks using only one array. **(8)**

OR

   a) What is a stack? Write a program showing array based implementation of stack. **(8)**

   b) Write algorithm to convert an infix expression to prefix expression. **(8)**

Unit - IV

4. a) Write an algorithm to delete an element X from a binary search tree. Do the time analysis of your algorithm. **(8)**

   b) Explain how the balance is restored when an insertion into height balanced tree puts a node out of balance. **(8)**

OR

   a) Insert the following entries into an initially empty B-tree of order 5 : **(10)**

   a, g, f, b, k, c, h, n, j, d, r, i, s, x, e, l, m, t, u, v.

   b) What are the advantages & disadvantages of circular linked list? **(6)**

Unit - V

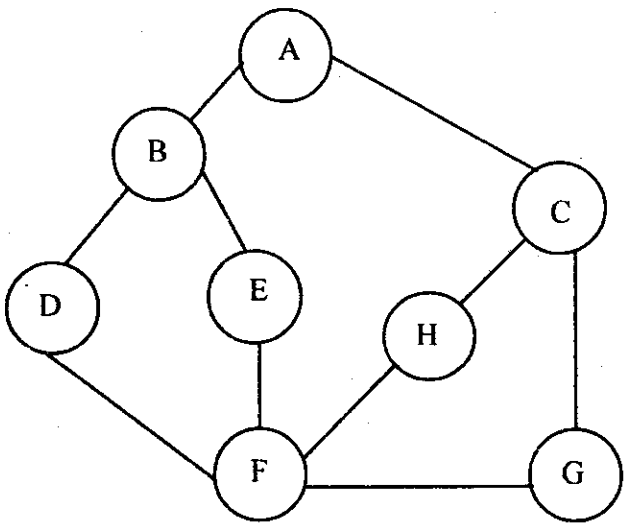
5. a) Find out the time complexity of Quick sort. What happens if all the keys in the list are equal in case of Quick sort? **(8)**

   b) Write the algorithm for Insertion sort. How many key comparisons are made in its worst case? **(8)**

OR

   a) What are connected components of a Graph? Write a method to find out all connected components of a graph. **(10)**

   b) A graph is shown below :



   Give Adjacency Matrix & List representation. **(6)**

6E3112

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6E3112

B. Tech. VIth Semester (Main/Back) Examination, June - 2010
Electrical Engineering
6EE4 Advanced Power Electronics
(Common for 6EE4 &6EX4)

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

Min. Passing Marks : 24

Instructions to Candidates:

*Attempt overall **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 may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

Unit - I

1. a) Explain the principle of ON-OFF control for single phase full wave controller. **(8)**

b) An ac voltage controller shown in figure (1) has a resistive load R=05 Ω and rms input voltage is V_s = 120 V, 60 Hz. The thyristors switch is on for n =125 cycles and is off for m = 75 cycles. Determine **(8)**

i) the rms output voltage V_o and

ii) the input power factor (PF)

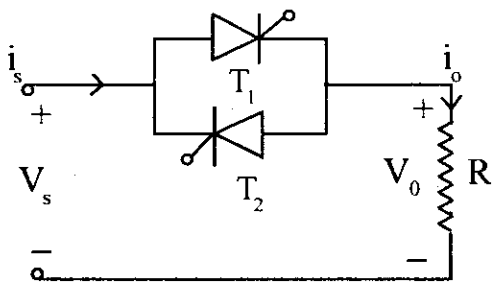

Figure - 1

2. a) For a single phase full wave controller with RL load draw the wave forms of output voltage, output current and voltage across thyristors. Determine the expression for rms output voltage. **(8)**

b) The single phase full wave controller shown in figure (2) supplies an RL load. The input voltage is V_s = 120 V (rms) at 60 Hz. The load is such that L = 5MH and R = 5Ω. The delay angles for thyristors T_1 and T_2 are equal, where $\alpha = \pi/3$. Determine (8)

i) the conduction angle of thyrisistor T_1 δ and

ii) the rms output voltage V_o.

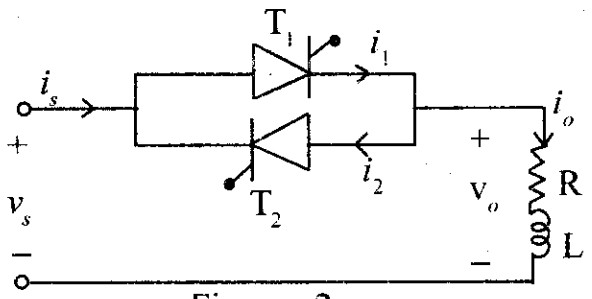

Figure - 2

Unit - II

3. a) Explain the operation of three phase bridge inverters for 180° conduction and star connected load. **(8)**

b) The three bridge phase inverter has a star connected load of R = 5Ω and L = 23 mH. The inverter frequency is f_0 = 60 Hz and the dc input voltage is V_s = 220 V. Determine (i) the rms line voltage V_L and (ii) the rms line voltage V_{L1} at the fundamental frequency. **(8)**

4. a) Explain the sinusoidal pulse width modulation technique for voltage control of single phase inverters. **(8)**

b) Describe the operation of three phase current source inverter for star connected load. **(8)**

Unit - III

5. a) Describe the basic principle of working of a single phase to single phase cycloconverter for both continuous and discontinuous conductions for a bridge type configuration. Mark the conduction of various thyristors. **(8)**

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

6. a) Show that the fundamental RMS value of per phase output voltage of low frequency for an m-pulse cycloconvertor is given by

$$E_{or} = E_{ph}\left(\frac{m}{\pi}\right) Sin\left(\frac{m}{\pi}\right)$$ **(8)**

b) Describe the control scheme for a cycloconvertor using voltage - sensing principle of converter group selection. Also draw and discuss the various voltage waveforms of a control scheme. **(8)**

Unit - IV

7. a) Explain the Half bridge converter operation for continuous mode. **(8)**

b) Describe the configuration of half bridge and full bridge resonant DC power supplies. **(8)**

8. a) Explain the operation of forward converter for continuous mode. **(8)**

b) Explain the bidirectional power supply operation and working. **(8)**

Unit - V

9. a) Explain the working of switched mode ac. power supply. **(8)**

b) Explain the voltage mode control of forward converter. **(8)**

10. a) Explain current mode controlled flyback regulator. **(8)**

b) Explain the operation of bidirectional ac power supply. **(8)**

6E3115

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6E3115

B. Tech. VIth Semester (Main/Back) Examination, June - 2010

Electrical Engineering

6EE6.2 Power System Instrumentation (Elective)

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

Min. Passing Marks : 24

Instructions to Candidates:

*Attempt overall **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 may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

Unit - I

1. a) Define accuracy and precisian with example and differentiate them. **(8)**

   b) Define Gaussian error curves and probable error. **(8)**

OR

   a) Describe various types of errors and explain the combination of errors. **(8)**

   b) A resistance is determined by voltmeter Ammeter method. The voltmeter reads $100\,v$ with a probable error of $\pm 12\,v$ and ammeter reads 10 A with a probable error of $\pm 2\,A$. Determine the probable error in the computed value of resistance. **(8)**

Unit - II

2. a) Explain the construction & principle of working of a linear voltage differential transformer (LVDT). Explain how the magnitude & direction of the displacement of core of an L.V.D.T. detected. **(8)**

   b) Describe the method for measurement of temperature with use of RTD's. And describe the advantages and limitations. **(8)**

OR

Differentiate between the following with suitable examples :- **(16)**

i) Transducers & Inverse Transducers.

ii) Active & Passive Transducers.

iii) Primary & Secondary Transducers.

iv) Analog & Digital Transducers.

Unit - III

3. a) Draw a block diagram of an a.c. signal conditioning system and the function of each block. **(8)**

   b) Write short notes on shielding & grounding. **(8)**

OR

   a) Explain the working principle of a function generator with block diagram. **(8)**

   b) Explain the sample & hold circuit. **(8)**

Unit - IV

4. a) Describe the constructional details of a single phase induction type energy type meter. **(8)**

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

OR

   a) Explain the circuit of a multimeter for measurement of a.c. voltages. **(8)**

   b) Describe the active and reactive power in the different plants. **(8)**

Unit - V

5. a) Describe how high currents & voltages are measured with the help of instrument transformer. Draw HR necessary diagrams. **(8)**

   b) Discuss the major sources of errors in current transformer. **(8)**

OR

   a) Describe the working of a capacitive type potential transformer with their transient behaviour. **(8)**

   b) Explain the wilson compensation method for reduction of errors in current transformers. **(8)**

6E3109

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6E3109

B.Tech. VIth Semester (Main/Back) Examination, June - 2010

Electrical Engineering

6 EE1 Modern Control Theory (Common for EE & EX)

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

Min. Passing Marks : 24

Instructions to Candidates:

*Attempt overall **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 may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. Calculator.

Unit-I

1. a) Define linear, independence of vectors. What information do they give about the controllability of the system. Define

   i) Bases

   ii) Domain

   iii) Range of a vector space. **(8)**

   b) How is Linearity defined in reference of a control system. Can a nonlinear system be linearised? Which techniques do you know? **(8)**

OR

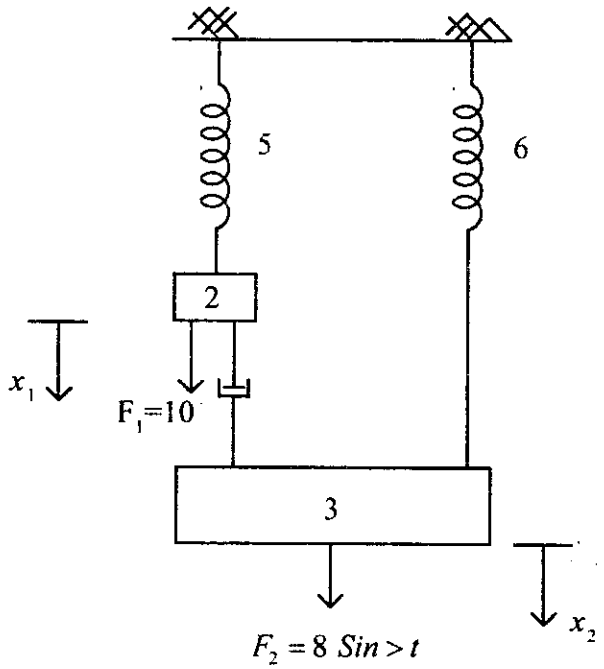
   a) Differentiate between Modern and conventional control system. **(8)**

   b) i) What is meant by causal and non-causal systems.

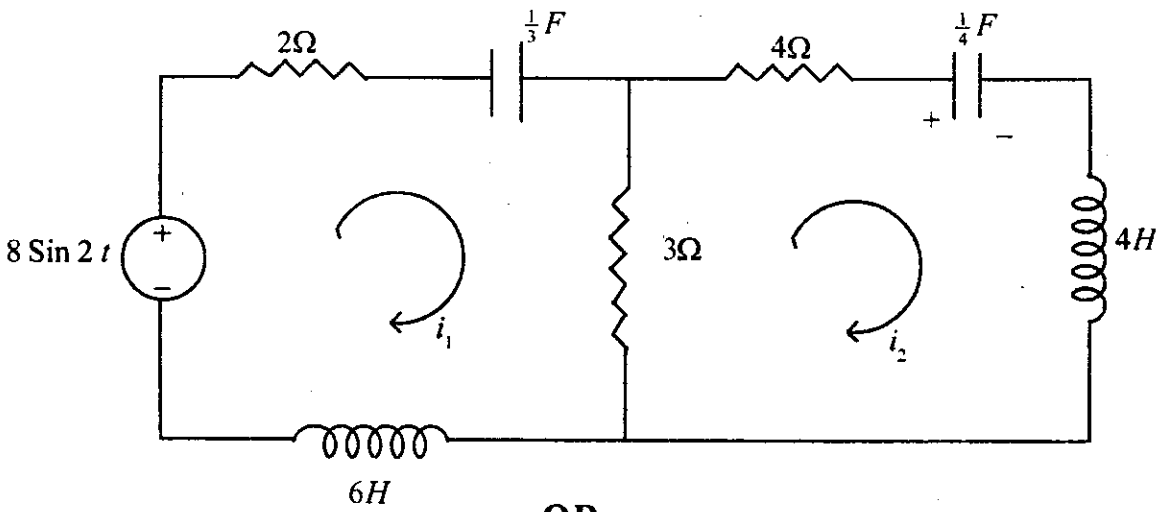
   ii) Define state, state space and state space equations. **(8)**

Unit-II

2. a) Obtain the state space representation for the following mechanical system. **(8)**



b) Write differential equations governing the following electrical circuit and hence develope transfer function for it. **(8)**

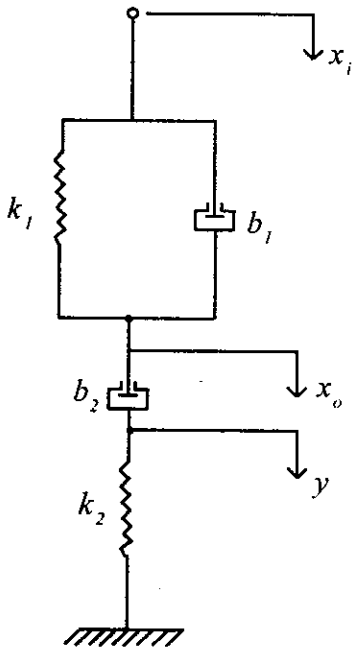


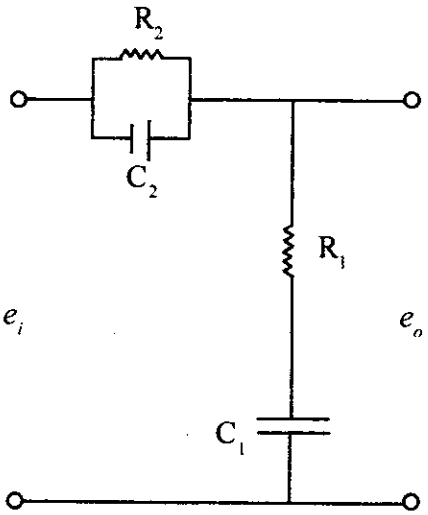
OR

a) A system is described by following differential equation. Derive the state model for it.

$$\frac{d^3y}{dt^3}+6\frac{d^2y}{dt^2}+2\frac{dy}{dt}+4y=-5\frac{d^2u}{dt^2}+8\frac{du}{dt}.$$ **(6)**

b) Show that systems shown in figures below are analogous systems. Find the transfer functions of both.





(10)

Unit-III

3. a) A control system is described by following transfer function. $\frac{Y(s)}{U(s)}=\frac{s+12}{s^2+7s+12}$ obtain the state space representation of this system in

i) Controllable phase variable form.

ii) Observable phase variable form. **(8)**

b) Consider the system

$\dot{x}=\begin{bmatrix}0 & 1\\ -2 & -3\end{bmatrix}X \cdot \quad X(0)=\begin{bmatrix}0\\ 1\end{bmatrix}$ Find the free response of the system. **(8)**

OR

a) Consider the system

$$\dot{X}=\begin{bmatrix}-3 & 1\\ -2 & 0\end{bmatrix}X+\begin{bmatrix}0\\ 1\end{bmatrix}Y$$

$$Y=[1 \;\; 0]X.$$

Find the transfer function $\frac{C(s)}{R(s)}$ of the above system. **(8)**

b) Consider the same system given in the above equation. Transform the system by similarity transformation defined by $X=P\overline{X}=\begin{bmatrix}2 & -1\\ -1 & 1\end{bmatrix}\overline{X}$. **(8)**

Unit-IV

4. a) For the system matrix

$$A=\begin{bmatrix}-4 & 1 & 0\\ 0 & -3 & 1\\ 0 & 0 & -2\end{bmatrix}$$ Find the eigenvalues and eigenvectors. **(8)**

b) Write short notes on : **(any two)**

i) State transition matrix

ii) Caley - Hamilton Theorem

iii) Kalman's method of controllability and observability. **(4 each)**

OR

a) The transfer function $G(s)$ of a system is given by $G(s)=\dfrac{s+3}{(s+2)^2(s+5)}$.

Transform the system in Jordan cannonical form. **(8)**

b) Write short notes on : **(any two)**

i) Pole - placement Design

ii) Eigenvalues & Eigenvectors

iii) Solution of state equation. **(4each)**

Unit-V

5. a) Consider the system $\dot{X}=AX+BY$ and $Y=CX$ with

$$A=\begin{bmatrix}0 & 1\\ 0 & 0\end{bmatrix}\quad b=\begin{bmatrix}0\\ 1\end{bmatrix}\text{ and }\quad c=\begin{bmatrix}1 & 0\end{bmatrix}$$

Design a feedback control law to place the closed loop poles at $s=-4\pm j4$.**(8)**

b) How are digital control systems different from continuous time control systems. How are they analysed and what stability tests are available to check their stability. **(8)**

OR

Write short notes on : **(any two)**

i) Ackerman's Formula.

ii) Sampled data control systems.

iii) Digital PID controller. **(8each)**

6E3111

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6E3111

B.Tech. VIth Semester (Main/Back) Examination, June - 2010

Electrical Engineering

6EE3 Protection of Power Systems (Common for EE and EX)

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

Min. Passing Marks : 24

Instructions to Candidates:

*Attempt overall **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 may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

Use of following supporting material is permitted during examination (Mentioned in form No. 205)

1. Logarithmic Table.

Unit - I

1. a) Explain what are primary protection and back-up protection? Discuss the remote back-up protection by simple time graded relays. **(8)**

b) Explain the following schemes with basic requirements of protection system, used in circuit breakers. **(8)**

i) Trip circuit with relay of make type contact.

ii) Trip circuit with relay of break type contact.

OR

a) How to minimize the ratio error and phase angle error in the instrument transformer? **(6)**

b) There are 300 turns in secondary of a current transformer with single turn primary. A resistive load of 3 ohm at 3A is connected with the secondary. At frequency of 50 Hz, 80 AT is the magnetising *m.m.f* required to set up the flux in the core. The magnetic core has cross-sectional area of 5cm^2. Find the ratio and phase angle of the current transformer, and the maximum flux density in the core neglecting the iron and copper losses. **(10)**

Unit - II

2. a) To use a direction relay what are the conditions to be satisfied? Explain briefly. **(3+4=7)**

   b) Describe the differences between time over current relay, directional relay, differential relay. **(9)**

OR

   a) Find the universal relay torque equation and what is the use of this equation? **(6)**

   b) The current rating of a relay is 3A. PSM is 1.0 ; CT ratio is 300/3, fault current is 3000A. Find the operating time of the relay for a TMS (Time Multiplier Setting) = 0.3. At TMS = 1, the operating time at various PSM are :

P S M	2	4	6	7	8	10
Operating Time (s)	8	6	5	3	2.8	2.4

(10)

Unit - III

3. a) Draw and explain the Merz - Price protection of Alternator stator winding. State its advantage. **(9)**

   b) Explain the basic scheme for rotor earth fault protection. What are its advantages? **(4+3=7)**

OR

   a) With a neat sketch and vector diagram explain how a negative phase sequence relay is employed for protection of Electrical Power System. **(8)**

   b) Enumerate various faults and abnormal operating conditions to which a modern turbo alternator is likely to be subjected. **(8)**

Unit - IV

4. a) What is over fluxing in transformer? When it occurs? What are the methods to overcome this? **(2+2+3=7)**

   b) Draw and explain the diagram of the percentage differential protection scheme for transformers based on circulating current.

      i) Star - Delta transformer.

      ii) Delta - Star transformer. **(4+5=9)**

OR

a) Draw and explain the construction and working of Buchhotz's relay. Against which fault Buchhotz relay gives the protection? State its advantages and disadvantages. **(5+3=8)**

b) A three phase power transformer having a line voltage ratio of 400 V to 11 kV is connected in $Y-\Delta$. The CTs on 400 V side have current ratio 500/5. What must be the CT ratio on 11 kV side? **(8)**

Unit - V

5. a) Explain with diagram the working principle of MHO relay. Deduce the torque equation for the same. **(4+4=8)**

b) Explain the working principle of distance time impedance relay and its application. What are the advantages of distance relays? **(4+4=8)**

OR

a) Describe the scheme for single phasing protection of Induction motor. **(6)**

b) How phase fault protection is provided to the induction motor? **(5)**

c) What is phase reversal? What is its effect? How it is prevented in induction motors? **(5)**
