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6E1571

Roll No. _____ [Total No. of Pages : 2

6E1571

B.Tech. VI Sem. (Main/Back) Examination, June - 2022
Electrical & Electronics Engg.
6EX3-01 Computer Architecture

Time : 2 Hours

Maximum Marks : 80
Min. Passing Marks : 28

Instructions to Candidates:

*Attempt **all five** questions from **Part A**, **four** questions out of **six** questions from **Part B** and **two** questions out of **three** from **Part C**.*

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.

PART - A

All questions are **Compulsory.** (Answer should be given up to **25** words only)

(5×2=10)

1. What is a Co - Processor and its use?
2. Define Micro - operation with example?
3. Name two types of memory interleaving?
4. Differentiate synchronous and asynchronous bus.
5. Why does the DMA gats priority over CPU when both request memory transfer?

PART - B

Attempt any **FOUR** questions. (Analytical/Problem solving questions)

(4×10=40)

1. What is micro - programming? What are the advantages and disadvantages of micro programming?
2. What are the different between the hardwired control organization and micro programmed control organization.
3. Describe the concept of pipelining and give the basic structure of the pipeline processor.

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4. Discuss the difference between CISC and RISC.
5. Draw and explain the instructions Execution cycle with the help of an example.
6. What do you understand by interrupt? Explain the steps through which the processor handles the interrupts.

PART - C

Attempt any **TWO** questions. (Descriptive/Analytical/Problem Solving/Design Questions) **(2×15=30)**

1. What is the need for DMA transfer? Explain with the help of a block diagram, the data Transfer methodology using DMA.
2. Define the term : Instruction format and its addressing mode? Explain in detail the various addressing modes of commonly used by various CPUs.
3. Briefly Explain about 8086 micro processor architecture with programming model, concurrent operation of EU and BIU.

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6E1572

Roll No. _____ [Total No. of Pages : 3

6E1572

B.Tech. VI Sem. (Main/Back) Examination, June - 2022
Electrical Engg.
6EE4-02 Power System - II

Time : 3 Hours **Maximum Marks : 120**
Min. Passing Marks : 42

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**, **five** questions out of **Seven** from **Part B** and **Four** questions out of **Five** from **Part C**.*

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.

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

PART - A

(Answer should be given up to 25 words only)

All questions are **compulsory** **(10×2=20)**

1. In power flow analysis, Newton - Raphson (NR) method is superior to the Gauss - seidel (GS) method, give the Reason?
2. Define the Difference in the properties of Admittance matrix (Y_{bus}) and impedance matrix (Z_{bus}).
3. What is the difference between steady state stability and Dynamic stability?
4. What is the effect the generation Rescheduling on stability of power system?
5. What are the different states of power system.
6. Enumerate the methods of preventive control of power system.
7. What is the function of power Exchanges?
8. What is the the different shunt compensation methods?
9. Define the various functions of SCADA system?
10. Define equal Area criterion for power system stability.

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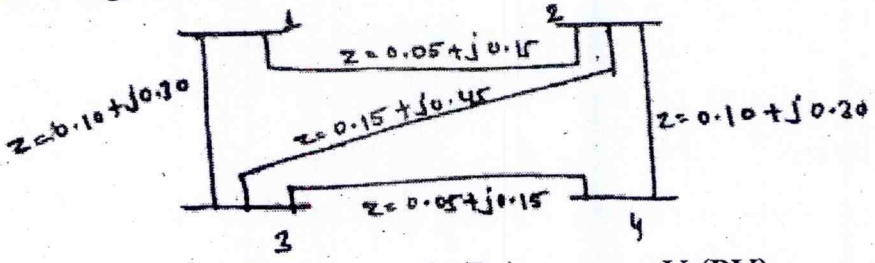
PART - B

(Analytical/Problem solving questions)

Attempt any **Five** questions **(5×8=40)**

1. For the system shown in fig the generators are connected at all the four buses. While loads are at bus 2 and 3. Values of real and reactive power are listed in table. All buses other than the slack bus are PQ buses. Assuming a flat voltage start find the voltage and bus angle at the three buses at the end of first G-S Iteration the shunt admittance is neglected

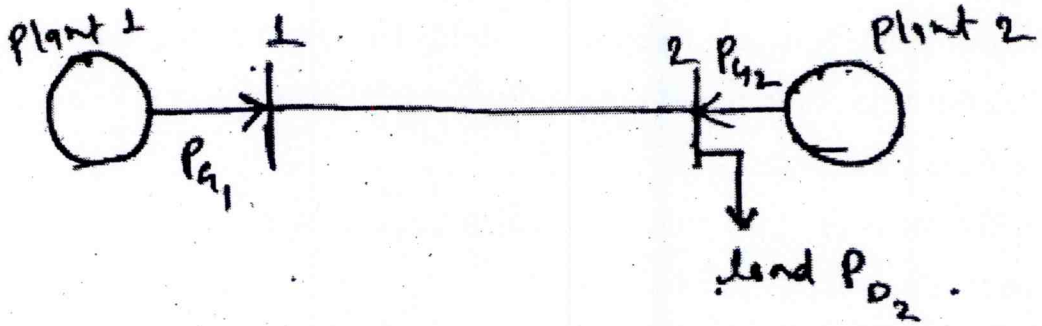


Bus No.	P_i (Pv)	Q_i (Pv)	V_i (PV)	Remark
1	-	-	1.04 Pv	slack
2	0.5	-0.2	-	PQ
3	-1.0	0.5	-	PQ
4	0.3	-0.1	-	PQ

2. A two bus system is shown in diagram. If 100 MW is transmitted from plant 1 to load, a transmission loss of 10 MW is incussed. Find the required generation for each plant and the power received by the load when the system λ is Rs. 25/ MWh.The incremental fuel costs of the two plants are given below :

$$\frac{dC_1}{dP_{G_1}} = 0.02P_{G1} + 16.00\ Rs/MWh$$

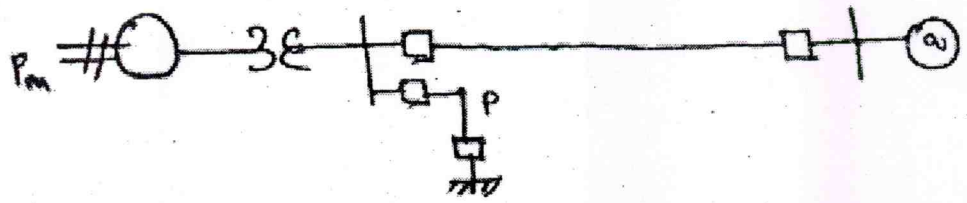
$$\frac{dC_2}{dP_{G_2}} = 0.04PG_2 + 20.00\ Rs/MWh$$



3. A 100 MVA synchronous generator operates on full load at a frequency of 50 Hz. The load is suddenly reduced to 50 MW. Due to time lag in governor system, the steam value begins to close after 0.4S. Determine the change in frequency that occurs in this time.
Given H = 5 KWs/KVA of generator capacity.

4. A 50 Hz, four pole turbo generator rated 100 MVA, 11 kv has an inertia constant at 8.0 MJ/MVA.
   a. Find the stored energy in the rotor at synchronous speed.
   b. If the mechanical input is suddenly raised to 80 MW for an electrical load of 50 MW, find rotar acceleration. Neglecting mechanical and electrical losses.

5. Calculate the mathematical expression for critical clearing time in case of a three phase fault occure at outgoing radial line at point p in the given power system.



6. Explain the power flow control using embedded DC links in detail.
7. Derive the load flow equations also describe the different type of Buses in power system.

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any **Four** questions **(4×15=60)**

1. Explain the Newton Raphson (NR) method using polar. Co-ordinates for solution of load flow study in detail.
2. The generator as shown in fig is delivering 1.0 PV power to the infinite bus ($|v| = 1.0PV$), with the generator terminal voltage of $|v_i| = 1.0PV$, calculate the generator emf behind transient reactance, find the maximum power that can be transferred under the followng conditions :
   a. System healthy.
   b. One line shorted (3-phase) in the middle.
   c. One line open.

   Plot all the three power angle curves.
3. Explain the different type of electricity market models in detail, also make the suitable block diagram to explain them.
4. Model the complete Block diagram representation of single area load frequency control of an Isolated power system. Explain the modeling of each component saperately.
5. Write detail note on the following :
   a. State - estimation.
   b. Contingency Analysis.

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6E1573

Roll No. _____ [Total No. of Pages : 2

6E1573

B.Tech. VI Sem. (Main/Back) Examination, June - 2022
Electrical Engg.
6EE4-03 Power System Protection

Time : 3 Hours **Maximum Marks : 120**
Min. Passing Marks : 42

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**, **five** questions out of **Seven** from **Part B** and **Four** questions out of **Five** from **Part C**.*

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.

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

PART - A

(Answer should be given up to 25 words only)

All questions are **compulsory** **(10×2=20)**

1. Define the term pick up value in a protective relay.
2. Write universal torque equation.
3. What are the different types of faults occurring in power system?
4. Discuss the merits of MHO relay.
5. What do you mean by digital protection?
6. What is relay testing?
7. What is reach, under reach and over reach of relay?
8. Compare CT and PT.
9. What are df/dt relays?
10. Name different system protection schemes.

PART - B

(Analytical/Problem solving questions)

Attempt any **Five** questions **(5×8=40)**

1. Explain the essential qualities of relay in detail.

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2. Explain the working principle of distance relays.
3. Write a detailed note on overcurrent protection.
4. Describe use of fourier analysis in digital protection.
5. Discuss CT/PT modeling and standards.
6. What are application of WAMS for improving protection systems.
7. Explain the phenomenon on arc interruption.

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any **Four** questions **(4×15=60)**

1. Describe the principle of
   i. Under - frequency relay.
   ii. Under - voltage relay.
2. Describe estimation of phasors from DFT.
3. Explain construction and operation of differential relays and explain how these relays are helpful in protection.
4. How transients are simulated using electro - magnetic transients (EMT) programs.
5. Explain the initiation of arc, maintenance of arc and methods for interrupting arc in a circuit breaker.

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6E1574

Roll No. _____ [Total No. of Pages : 2

6E1574

B.Tech. VI Sem. (Main/Back) Examination, June - 2022
Electrical Engg.
6EE4-04 Electrical Energy Conversion and Auditing

Time : 3 Hours **Maximum Marks : 120**

Min. Passing Marks : 42

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**, **five** questions out of **Seven** from **Part B** and **Four** questions out of **Five** from **Part C**.*

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.

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

Part - A

(Answer should be given up to 25 words only)

All questions are **compulsory** **(10×2=20)**

1. Define the terms energy pricing and energy security. **(2)**
2. What is maximum demand control? **(2)**
3. What is energy audit and its need? **(2)**
4. Define motor efficiency. What are various factors affecting motor performance? **(2)**
5. Define the term fault ride - through for wind - farm. **(2)**
6. What is electronic ballast? What is thermal energy content of fuel? **(2)**
7. Define energy management and energy performance. **(2)**
8. Define electrical load management. **(2)**
9. What is electricity billing? **(2)**
10. What is bench marking? **(2)**

Part - B

(Analytical/Problem solving questions)

Attempt any **five** questions **(5×8=40)**

1. What is the difference between commercial and non - commercial energy? Discuss the present energy scenario in India. **(8)**
2. What is electricity tariff? Discuss about selection and location of capacitors. **(8)**

3. What are the various types of energy audit? Write a short note on energy audit instruments. **(8)**

4. What are the disadvantages of low power factor? What are the various methods to improve the power factor? Also write few benefits of power factor improvement. **(8)**

5. What are maximum demand controllers? Explain about automatic power factor controllers? **(8)**

6. The load on an installation is 800 kw, 0.8 power factor lagging which works for 3000 hours per annum. The tariff is Rs. 100 per KVA plus 20 paise per KWh. If the power factor is improved to 0.9 lagging by means of loss free capacitors costing Rs. 60 per KVAR. Calculate the annual saving effected. Allow 10% per annum for interest and depreciation on capacitors. **(8)**

7. Write a short note on :

   a. Solar PV and wind farm behavior during grid disturbances. **(4)**

   b. Power quality issues. **(4)**

Part - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any **Four** questions **(4×15=60)**

1. Explain restructuring of the energy supply sector. Also discuss about the energy conservation and its importance. **(15)**

2. Discuss about energy management approach understanding energy costs. Also explain optimization of the input energy requirements, fuel and energy substitution. **(15)**

3. Discuss the performance assessment of power factor capacitors, distribution and transformer losses. Also discuss briefly about losses in induction motor. **(15)**

4. Explain about the hybrid and isolated operations of solar PV and wind systems. Also discuss about grid code technical requirements. **(15)**

5. Write a short note on the following :

   a. Variable speed drives and Occupancy sensors. **(5)**

   b. Energy efficient lightining controls and energy efficient transformers. **(5)**

   c. Energy efficient motors and soft starters with energy saver. **(5)**

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6E1575

Roll No. _____ [Total No. of Pages : 2

6E1575

B.Tech. VI Sem. (Main/Back) Examination, June - 2022
Electrical Engg.
6EE4-05 Electric Drives

Time : 3 Hours **Maximum Marks : 120**

Min. Passing Marks : 42

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**, **five** questions out of **Seven** from **Part B** and **Four** questions out of **Five** from **Part C**.*

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.

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

PART - A

(Answer should be given up to 25 words only)

All questions are **compulsory.** **(10×2=20)**

1. Draw the speed - torque characteristics of separately excited DC motor.
2. What do you understand with the term operating point?
3. What is electric drives and list the element of electric drives?
4. Draw the relation between speed - torque characteristics of induction motor and pump load.
5. What do you mean by smooth starting DC motor?
6. What are the different methods of speed control of slip ring IM?
7. What is field oriented control of induction motor?
8. List the factors affecting selection of electric drives.
9. State the selection of motor bases on load variation.
10. What are the advantages of Ward Leonard method?

PART - B

(Analytical/Problem solving questions)

Attempt any **five** questions. **(5×8=40)**

1. Draw and explain the block diagram of a closed loop control of DC drive.
2. Explain Ward Leonard method of speed controlling.

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3. Explain four quadrant operation of chopper.
4. Explain direct torque control of induction motor and why it is needed?
5. Explain static Kramer drive for IM drives with necessary derivation and sketches.
6. Explain slip power recovery using phasor diagram.
7. The rotor of a 4 - pole, 50 - Hz, slip ring induction motor has a resistance of 0.25 Ω per phase and runs at 1440 rpm at full load. Calculate the external resistance per phase which must be added to lower the speed to 1200 rpm the torque being the same as before.

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any **Four** questions. **(4×15=60)**

1. Explain PWM principle for speed control and slip energy recovery scheme of 3-ϕ induction motor drives. **(15)**
2. Explain vector control of speed control in 3-ϕ induction motor. Also write the limitation of vector control method. **(15)**
3. a. State and explain regenerative braking. **(6+9)**

   b. A 220 V, 200 A, 800 rpm DC separately excited motor has an armature resistance of 0.06 Ω. The motor armature is fed from a variable voltage source with an internal resistance of 0.04 Ω. Calculate internal voltage of the variable voltage when the motor is operating in regenerative braking at 80% of the rated motor torque and 600 rpm.
4. a. Comment with relevant justification that stator voltage control method is most suitable for fan and pump motor drives. **(7+8)**

   b. Draw and explain the speed torque characteristics of VVVF control of induction motor for various operating speed. Also discuss the speed limit to be achieved for obtaining constant motor torque using this method.
5. 3 - ϕ delta connected, 6 - pole, 50 Hz, 400 V, 925 rpm IM has following parameters:

   Rs = 0.2 Ω , $R_r' = 0.3\ \Omega$, $X_s = 0.5\ \Omega$, $X_r' = 1\ \Omega$ motor is fed from VSI with V/f control. Determine :

   i. Speed for frequency of 40 Hz and full load.

   ii. Determine speed for 40 Hz and half load.

   iii. Determine frequency at 700 rpm and full load.

   iv. Determine frequency at 700 rpm and half load. **(3+4+4+4=15)**

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6E1576

Roll No. _____ [Total No. of Pages : 2

6E1576

B.Tech. VI Sem. (Main/Back) Examination, June - 2022
Electrical Engg.
6EE5-11 Power System Planning

Time : 3 Hours **Maximum Marks : 120**
Min. Passing Marks : 42

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**, five questions out of **Seven** from **Part B** and **Four** questions out of **Five** from **Part C**.*
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.
Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

PART - A

(Answer should be given up to 25 words only)

All questions are **compulsory** **(10×2=20)**

1. Explain the electrical forecasting.
2. Write the few names of regulatory authorities which involves in power system planning.
3. Explain reliability target.
4. Explain security requirement in power system reliability.
5. List the various methods of cogeneration.
6. List the factors affecting generation planning.
7. What are the effects of disconnects?
8. What are the effects of lateral distribution protection?
9. What is reactive compensation?
10. What are the technological impacts of green house effect?

PART - B

(Analytical/Problem solving questions)

Attempt any **five** questions. **(5×8=40)**

1. What are the challenges faced by power system planning engineers?
2. Explain the concept of least cost utility planning with the aid of flowchart.

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3. Briefly explain the reliability planning criteria for generation.
4. Why integrated power generation is required?
5. What are the different factors affecting the interconnection under emergency assistance?
6. Write the objectives of power system transmission planning.
7. Explain minimum assured reliability constraints by using optimization techniques of solution by programming.

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any **Four** questions. **(4×15=60)**

1. a. Mention and explain factors affecting the load of utility in forecasting modeling.
   b. Define the electricity regulators involves in the power system planning.
2. a. How the reliabity and quality related in power system planning?
   b. Explain the grid reliability in power system.
3. a. Briefly explain the loss of load in generation planning.
   b. Explain the terms outage rate and scheduled outage.
4. a. What do you understand by system and load point indices?
   b. Define the different distribution reliability indices.
5. a. Define the concept of wheeling and wheeling charges in power system.
   b. What is insulation coordination? Explain the principle of insulation coordination.

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6E1578

Roll No. _____ [Total No. of Pages : 2

6E1578

B.Tech. VI Sem. (Main/Back) Examination, June - 2022
Electrical Engg.
6EE5-13 Electrical and Hybrid Vehicles

Time : 3 Hours **Maximum Marks : 120**
Min. Passing Marks : 42

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**, **five** questions out of **Seven** from **Part B** and **Four** questions out of **Five** from **Part C**.*

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.

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

PART - A

(Answer should be given up to 25 words only)

All questions are **compulsory** **(10×2=20)**

1. What is hybrid energy storage system. (2)
2. What is propulsion load? (2)
3. Mention different electric motors used in hybrid vehicles. (2)
4. What is battery energy storage? (2)
5. What is hybrid vehicles? (2)
6. Give the drive train configuration in hybrid vehicle? (2)
7. Why energy management system strategies require. (2)
8. Distinguish between HEV and BEV. (2)
9. What is charge capacity of a battery. (2)
10. What is ICE? (2)

PART - B

(Analytical/Problem solving questions)

Attempt any **Five** questions **(5×8=40)**

1. Compare the different energy management strategies? **(8)**
2. Explain in brief about the design principle for parallel hybrid vehicle. **(8)**
3. What are the advantage of hybrid vehicles as compared to the conventional vehicles. **(8)**
4. Briefly explain about different components of hybrid vehicles. **(8)**
5. With necessary functional block diagram explain parallel hybrid drive train configuration? **(8)**
6. Explain in brief about sizing the power electronics in drive system? **(8)**
7. Explain the configuration and control of induction motor drives? **(8)**

PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any **Four** questions **(4×15=60)**

1. Explain the design of HEV with a case study. **(15)**
2. Explain about different control strategy of PM machines used in hybrid electric vehicle. **(15)**
3. Give expression for transmission characteristics and mathematical model to describe vehicle performance. **(15)**
4. Explain about hybridization of different energy storage devices in detail. **(15)**
5. What is the social and environmental importance of hybrid and electric vehicles. **(15)**

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6E6071

Roll No. _____ [Total No. of Pages : 3

6E6071

B.Tech. VI Sem. (Back) Examination, June - 2022
Electrical & Electronics Engg.
6EX1A Modern Control Theory

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.*

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

UNIT - I

1. a) Define state variables. Give the difference between modern control theory and conventional control theory. **(8)**

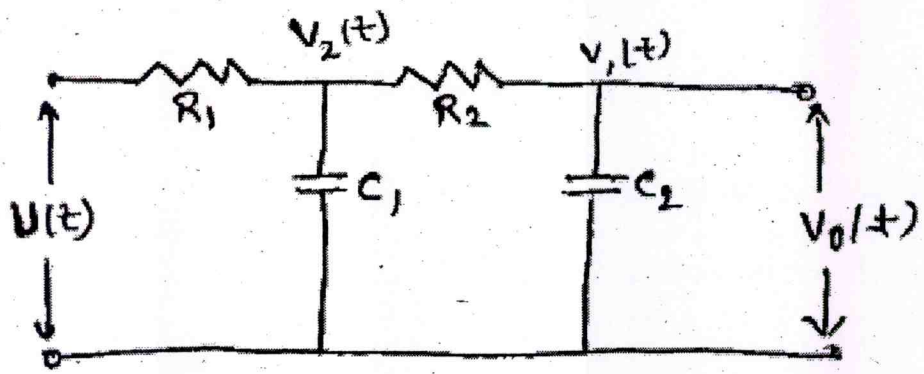
   b) Show that the vectors.

   $X_1 = (2,-2,1)$, $X_2 = (1,4,-1)$ and $X_3 = (4,6,-3)$ are linearly independent. **(8)**

(OR)

1. a) Explain concept of linear vector space. also describe state model of a linear system. **(8)**

   b) Write the state equation for the given system. **(8)**



UNIT - II

2. a) For the given transfer function, obtain the state model. **(8)**

$$G(s) = \frac{k}{s^3 + a_3 s^2 + a_2 s + a_1}$$

b) Obtain the state model in Jordan's canonical form of a system whose transfer function is $T(s)=\frac{1}{(s+2)^2(s+1)}$. **(8)**

(OR)

2. a) Decompose the transfer function

$$\frac{Y(s)}{U(s)}=\frac{5(s^3+5s^2+6s)}{s^3+6s^2+9s+4}.$$ **(10)**

b) Explain Cascade and Parallel decomposition in brief. **(6)**

UNIT - III

3. a) Compute the STM when $A=\begin{bmatrix}-1 & 1\\ 0 & 2\end{bmatrix}$. **(8)**

b) Describe state transition matrix and derive its properties. **(8)**

(OR)

3. a) Define :

i) Eigen values.

ii) Eigen vector.

iii) Diagonalization.

iv) Controllability **(4×2=8)**

b) Consider the following system

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix}=\begin{bmatrix}-0.5 & 0\\ 0 & -2\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}0\\ 1\end{bmatrix}\text{u(t)}$$

$Y(t)=\begin{bmatrix}0 & 1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}$ test for controllability and observability. **(8)**

UNIT - IV

4. a) Find the inverse Z transform of $H(z)=\frac{-4+8z^{-1}}{1+6z^{-1}+8z^{-2}}$. **(8)**

b) Describe Relation between S domain and Z domain. **(8)**

(OR)

4. Write Short Note on (any two). **(2×8=16)**

a) Sampled data control system.

b) Properties of Z transform.

c) Signal reconstruction.

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UNIT - V

5. a) Apply routh Hurwitz criterian to determine the stability of system $2s^5 + s^4 + 6s^3 + 3s^2 + s + 1 = 0$. **(8)**

b) Explain Jury stability criterion in detail. **(8)**

(OR)

5. a) Explain Digital PID controller with diagram. **(8)**

b) State and explain Bilinear transformation. **(8)**

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6E6072

Roll No. _____ [Total No. of Pages : 2

6E6072

B.Tech. VI Sem. (Main/Back) Examination, June - 2022
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.*

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

UNIT - I

1. a) Explain the mechanism of breakdown in gases. **(8)**
   b) Describe the breakdown in electromagnetic gases? **(8)**

(OR)

1. a) Explain the breakdown mechanism in solids? **(8)**
   b) Describe the application of gas and liquid in power apparatus? **(8)**

UNIT - II

2. a) By help of suitable diagram working of cascaded transformer? **(8)**
   b) Describe the Impulse voltage and basic impulse circuit? **(8)**

(OR)

2. a) Explain the Klydonorgraph? **(8)**
   b) Explain the construction and operation of sphere gap? **(8)**

UNIT - III

3. a) Explain the narrow band PD detection circuits? **(8)**
   b) Describe the high voltage schering bridge? **(8)**

(OR)

3. a) Explain the dielectric constant and loss factor? **(8)**
   b) Describe the partial discharge equivalent circuit? **(8)**

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UNIT - IV

4. a) Explain the causes of over voltage and over voltage due to lighting? **(8)**

   b) What is travelling waves on open and transmission line? **(8)**

(OR)

4. a) Describe the attenuation of traveling waves? **(8)**

   b) Explain the concept of line terminated through a resistance? **(8)**

UNIT - V

5. a) Explain the non - linear gap type and metal oxide gapless type light arresters? **(8)**

   b) Explain the basic impulse insulation level and coordination of insulation level? **(8)**

(OR)

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

   a. Ground Wire.

   b. Ground rods.

   c. Surge absorber.

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6E6073

Roll No. _____ [Total No. of Pages : 3

6E6073

B.Tech. VI Sem. (Back) Examination, June - 2022
Electrical and Electronics Engineering
6EX3A Switchgear & Protection

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.

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

UNIT - I

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

   b) Explain the phase comparision technique based on

      i) Phase Spliting

      ii) Integration

      Illustrate with the help of block diagram and waveforms. **(4×2=8)**

(OR)

1. a) What are the factors affecting the performance of relays. Describe briefly. **(8)**

   b) Explain the characteristics of various types of over current relays. **(8)**

UNIT - II

2. a) Describe the principle of differential system of protection applied to a power transformer explain the experienced difficulties and their solutions. **(8)**

   b) Explain briefly the different types of static impedance relays used. **(8)**

(OR)

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2. a) With the help of characteristics and circuit diagram explain how static MHO relay is realized using phase comparator. (8)

b) Enumerate the various static distance relay schemes. Explain any one scheme. (8)

UNIT - III

3. a) What is current carries protection? Explain the directional comparison method of current carrier protection. (8)

b) Discuss the various methods of protection of a transmission line with reference to advantage and disadvantage of each method. (8)

(OR)

3. a) Explain the function of starting Element (SE), measuring element (ME) and time in distance protection. (8)

b) Explain the quadrilateral and elliptical relays with suitable diagram. Differentiate between the quadrilateral and elliptical relays. (8)

UNIT - IV

4. a) Discuss the different arc-interruption theories for interruption of arc in circuit breakers. (8)

b) In a short circuit test on 132kv, 3-phase system, the breaker give the following results:

Power factor of the fault = 0.45

Recovery voltage - 0.9 time of full line voltage

The breaking current is symmetrical

The restriking transient has a natural frequency of 15khz.

Calculate the rate of rise of restriking voltage in the following types of faults.

i) Ground fault (4)

ii) Undergrounded fault. (4)

(OR)

4. a) Explain the classification of circuit breakers. Differentiate it with fuse. (8)

b) Explain the working principle of

i) HVDC circuit breaker (4)

ii) Air circuit breaker. (4)

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UNIT - V

5. a) Describe vacuum circuit breaker? Also explain its limitations, advantages and applications. **(8)**

b) A circuit breaker is rated as 2000A, 2000 MVA, 33KV, 6 Seconds, 3 ϕ oil circuit breaker.

Determine the following-

i) Rated normal current **(2)**

ii) Breaking capacity **(2)**

iii) Rated symmetrical breaking current **(2)**

iv) Rated making current **(2)**

(OR)

5. a) Briefly describe the following with response to the rating of circuit breaker.

i) Breaking capacity **(4)**

ii) Short time current rating **(4)**

b) Explain the important features which differentiates the digital relay from conventional relay in detail. **(8)**

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6E6074

B.Tech. VI Sem. (Back) Examination, June - 2022
Electrical & Electronics Engineering
6EX4A Advanced Power Electronics

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.*

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

Unit - I

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

(OR)

1. a) A three phase, 3 wire bidirectional controller, supplies a star connected R load of R = 5 Ω and line to line voltage of 210 V (RMS) at 50 Hz. The firing angle $(\alpha) = \frac{\pi}{2}$. Determine

   i. RMS output phase voltage E_0.

   ii. Input power factor.

   iii. Expression for instantaneous output voltage of phase 'A'. **(8)**

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

Unit - II

2. a) 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)**

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

(OR)

2. Describe three phase to three phase cyclo converter with relevant circuit arrangement using 18 SCRs. (16)

Unit - III

3. a) For a Single pulse Modulation used in inverters show that output voltages can be expressed as $V_0 = \sum_{n=1,3,5}^{\infty} \frac{4V_s}{n\pi} Sin\left(\frac{n\pi}{2}\right) \text{Sin}\, nd\ \text{Sin}(nw_1)$, where 2d in pulse width. (8)

b) A 3ϕ bridge inverter is fed from 200 V Dc source. The inverter is operated in 180° conduction mode and is supplying inductive, star connected load with R = 10 Ω and L = 20 mH. The inverter frequency is f_0 = 50 Hz. Calculate.

i. Instantaneous line to line voltage and current in fourier series.

ii. Total Harmonic distortion.

iii. Distortion factor.

iv. Average and RMS switch current. (8)

(OR)

3. Explain 120° mode of operation of V.S.I. compare V.S.I. and C.S.I with respect to their merits and demerits. Discuss the method of harmonic reduction in inverter by PWM. (16)

Unit - IV

4. a) Explain and working of L - type ZCS resonant converter. (8)

b) Write short note on series and parallel resonant inverter. (8)

(OR)

4. a) What are the advantages and limitations of ZCS and ZVS converters. (8)

b) What is Class E resonant inverter. (8)

Unit - V

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

b) Write short note on Resonant, AC power supply. (8)

(OR)

5. a) What is the conditioning of power factor? Discuss multistage converter used for conditioning of power factor. (8)

b) Explain the control circuit of current mode control and voltage mode control. (8)
