LAMPIRAN KEGIATAN
ACADEMIC CURRICULUM DEVELOPMENT
TAHUN ANGGARAN 2007

GBPP VERSI BAHASA INGGRIS

Jurusan Teknik Elektro
Fakultas Teknik
Universitas Diponegoro
Semarang
2007

LEARNING SPECIFICATION

Subject Name : **Electrical Machines I** ; **Code: TKE 403** ; **T: 2 Credit; P: Credit**

Prerequisite(s) : -

Subject Description : This lecture contain about some type of electric Machines that is DC Generator, DC Motor and Transformer which in it contain about principle work, construction, characteristic and also related/relevant calculation.

Learning Outcomes : Student will be able to understand to comprehend and explain the working principal, construction and also characteristic from some the electric machines type.

No	Learning Objectives	Topic	Sub-topic	Time (minutes)	Reference(s)
1	2	3	4	5	6
1	Having completed this fundamental discussion, major student of electrical engineering of semester V will be able to explain the division of electric machines of pursuant to voltage type used and also pursuant to its function and also can exemplify its application	1. Introduction	1.1. Energy conversion principal in general. 1.2 Classification of electric machine of pursuant to its function and voltage type 1.3 Convention going into effect	3 × 50	[1] [2] [3]
2	Having completed this fundamental discussion, major student of electrical engineering of semester V will be able to explain the principle work of the construction, division of classification, and also electrical analyse from DC generator and also can do the problem which is related to percentage of truth miniumal 90%	2. DC Generator	2.1 Equivalent circuit of electric machines according to way of excitation along with voltage equation and its energy. 2.2 Self excitation 2.3 Separated excitation - Series DC Generators - Shunt DC Generators	10 × 50	[1] [2] [3]

			- Compound DC Generators 2.4 Principle of voltage generation. 2.5.Working Principal and voltage equation from DC Generator along with energy conversion equation 2.6 DC generator Constructions 2.7 Armature reaction and commutation. 2.8 Generator Characteristics : 2.8.1 Internal Characteristics 2.8.2 Eksternal Characteristics 2.8.3 No Load Characteristics 2.9 DC Generator lossess : 2.9.1 Copper losses 2.9.2 Iron losses 2.9.3 Mechanical lossess 2.10 Generator Efficiencies DC: 2.10.1 Electrical efficiencies 2.10.2 Mechanical efficiencies 2.10.3 Commercial efficiencies 2.10.4 All day efficiencies		
3	Having completed this fundamental discussion, major student of electrical engineering of semester V will be able to explain the working principle, construction, classification and electricity analysis from DC.motor	3. DC Motor	3.1 DC.motor working principles 3.2 DC.motor back EMF concepts along with its equations 3.3 DC.motors (Series, Shunt, Compound) along with its voltage equation 3.4 The relation of torque, back EMF and speed at DC motor 3.5 DC.motor constructions 3.6 DC motor characteristics 3.7 Lossess and efficiency of DC motor 3.8 Various methods of starting. 3.9 Speed control of DC.motor with various methods	10 × 50	[1] [2] [3]

			3.10 Way of brakings		
4	Having completed this fundamental discussion, major student of electrical engineering of semester V will be able to explain the working principle, construction,classification and electricial analysis from Transformer and can do calculations related to percentage of success of 90%	4. Transformer	4.1 Understandings and working principles 4.2.Singie phaseTransformer 4.2.1 Construction and the types 4.2.2 Circuits equivalen and voltage equation 4.3 Transformer phasor diagrams 4.4 Loading and calculation of power. 4.5 Efficiency calculations. 4.6 Division of load at parallel operation of single phase transformer 4.7 Three phase transformers 4.7.1 Constructions 4.7.2 Classifications 4.7.3 Cooling systems 4.8 All kinds of connection of three phase transformer 4.9 Clock numbers 4.10 Division of load at three phase transformer parallel operation 4.11 Special transformers	10 × 50	[1] [2] [3]

Textbooks

[1] BL Theraja, 1984, *Electrical Engineering HandBook*, McGrawHill, Bombay, India
[2] Fitzgerald,A.E, 1996, Mesin-mesin Listrik,Erlangga, Jakarta,
[3] Nagrath,I.J, 1986, *Modern Power Syatem Analisis*,Tata McGraw-Hill, New Dehli, India

LEARNING SPECIFICATION

Subject Name : **Electrical Traction and Transportation System; Code: TKE 420 ; T: 2 Credit; P: Credit**

Prerequisite(s) : -

Subject Description : This lecture contains about some electrical traction system types and transportation that is electrical traction system and transportation of electrical direct current and traction system and transportation of alternating current in by it to contain about working principle, construction, characteristic and related calculations.

Learning Outcomes : Student will be able to understand to comprehend and explains working principles, construction and characteristic from some electrical traction system types and transportation.

No	Learning Objectives	Topic	Sub-topic	Time (minutes)	Reference(s)
1	2	3	4	5	6
1	Having completed this fundamental discussion, major student of electrical engineering of semester VII will be able to explain division of electrical traction system and transportation based on actuator type applied and based on function of and can exemplify the application of his.	1. Introduction	1.1. Assorted of locomotion at electrical traction system and transportation. 1.2 Classification of electrical Traction system and transportation based on locomotion and electric motor applied 1.3 Power feeder system at electrical traction and transportation	3 × 50	[1] [2]
2	Having completed this fundamental discussion, major student of electrical engineering of semester VII will be able to finalizes calculation traction mechanics	2. Traction mechanics and electrical	2.1 Traction mechanics. 2.1.1 Unit systems 2.1.2 Speed-time curves	10 × 50	[1] [2]

	and explains working principle, konstruction , classification, and electrical analysis from electrical traction system and transportation of direct current and can do problem related to percentage of truth of minimum 90%	power feeder and related equipments r	2.1.3 Various forces at traction system 2.2 Arrangement of Electricity feeder 2.2.1. Substation 2.2.2. Transformer, CB, DS, and other equipments. 2.3 Protection System at Traction system. 2.4 Rectifier systems of traction DC 2.5. Equipment at overhead lines. 2.6 Current collecting system : 2.6.1 Cable types 2.6.2 P*ole types* 2.6.3 B*ow types*. 2.6.4. P*antograph types* 2.7 Rectifiying equipment: 2.7.1 Mercury rectifier 2.7.2 Silicon rectifier 2.8 Traction Motor : 2.8.1 DC Motor 2.8.2 Series Motor 2.8.3 Repultion Motor 2.8.4.Induction Motor		
3	Having completed this fundamental discussion, major student of electrical engineering of semester VII will be able to explain way of speed control at traction system and performs calculation at related circuits.	3. Speed control and breaking	3.1 Traction motor speed control : 3.1.1 Series-paralel control 3.2.2 *Buck and boost* 3.2.3 *Metadyne* 3.2.4 *Thyristor* 3.3.5 *Master control* 3.4 Breaking technics: 3.4.2 Mechanical breaking 3.4.3 *Plugging* 3.4.4 *Rheostatic* 3.4.5 *Regeneratif*	10 × 50	[1] [2]

4	Having completed this fundamental discussion, major student of electrical engineering of semester VII will be able to mentions and explains about circuits track,sistem lighting, water system conditioning at electrical traction system and transportation along with calculations related to percentage of success of 90%	4. T*rack circuits,* lighting and *air conditionin*	4.1 Many types of T*rack* circuits: 4.1.1 *DC Track* 4.1.2 *AC Track* 4.1.3 *Frequency Track* 4.1.4 Many types of Signal 4.2. Lighting system that is usualy is utilized 4.3 Refrigeration system installation 4.3.1 Compresor 4.3.2 Condenser 4.3.3 Dehidrator 4.3.4 Filter	10 × 50	[1] [2]

Textbooks

[1] H Partab, 1980, *Modern Electric Traction*, Dhanpat Rai &Sons, Delhi, India
[2] Dover , AT, 1963, *Electric Traction*,Pitman &Sons Ltd., London,

LEARNING UNIT

Subject Name : **Electrical Machines I**
Code : **TKE 403**
Credits : **2**
Study Time : **2 × 50 minutes**
Study week : **VI**

A. Learning Objectives

1. General

This unit provides students with a direct current motor basis principle, analyses performance at steady state and application in field.

2. Specific

Students should be able to explain and calculates voltages, power and torque from direct current motor with minimum of 90% correctness.

B. Topic: Direct Current Motor

C. Sub-topic:

1. Comparison of generator and motor, back e.m.f calculation and voltage equation.
2. Electrical and mechanical characteristic depiction and power and torque calculation.

D. Learning Activities

Staging	Teacher Activities	Student Activities	Media and Teaching aid
Introduction	1. Explains the materials inclusion at this meeting. 2. Explains the relevance of this materials with electric machine 1 lecture 3. Explains Specific Learning Objectives from this materials.	Gives attention to	Transparent+OHP Power Point+LCD
Explanation	1 Explains comparison between generators and motor 2 Gives formulation of voltage, current and power 3 Depicts various mechanic and electrical characteristics from current motor	Gives attention to Does training Discuss	Transparent+OHP Power Point+LCD Whiteboard
End of session	1. Invites comment or question from student 2 Gives assessment to comment and answers question of student 3 Gives image of public about lecturing materials which will come	Gives comment and question about lecturing materials.	Transparent+OHP Power Point+LCD Whiteboard

E. Evaluation

Student is given by task calculation about voltage, current, power and torque and analyses operation characteristic from direct current motor

F. References

1. B.L Theraja, A.K Theraja, *A Textbook of Electrical Technology*, 23rd Edition, S. Chand & Company LTD, 2004

2 A.E. Fitzgerald, Charles Kingsly Jr., Stephen D. Umans, *Electric Machinery*, Sixth Edition, Mc Graw Hill, 2003

LEARNING UNIT

Subject Name : **Electrical Machines I**
Code : **TKE 403**
Credits : **2**
Study Time : **2 × 50 minutes**
Study week : **X**

A. Learning Objectives

1. General

This unit provides students with a transformer basis principle, analyses performance at steady state and application in field.

2. Specific

Students should be able to explain and calculates voltages, power and torque from transformer with minimum of 90% correctness.

B. Topic: Transformer

C. Sub-topic:

1. Calculation of voltage, current and power
2. Formation of equivalent circuit and depiction of diagram phasor

D. Learning Activities

Staging	Teacher Activities	Student Activities	Media and Teaching aid
Introduction	1. Explains the materials inclusion at this meeting. 2. Explains the relevance of this materials with electric machine 1 lecture 3. Explains Specific Learning Objectives from this materials.	Gives attention to	Transparent+OHP Power Point+LCD
Explanation	1. Explains formulation of voltage, current and power 2. Compilation of transformer equivalent circuit 3. Depicts diagram phasor for various load condition	Gives attention to Does training Discuss	Transparent+OHP Power Point+LCD Whiteboard
End of session	1. Invites comment or question from student 2 Gives assessment to comment and answers question of student 3 Gives image of public about lecturing materials which will come	Gives comment and question about lecturing materials.	Transparent+OHP Power Point+LCD Whiteboard

E. Evaluation

Student is given by homework in the form of calculation about voltage, current,power and compilation of equivalent circuit along with its approximation. Also depiction of phasor diagram for various load condition.

F. References

1. B.L Theraja, A.K Theraja, *A Textbook of Electrical Technology*, 23rd Edition, S. Chand & Company LTD, 2004

2 A.E. Fitzgerald, Charles Kingsly Jr., Stephen D. Umans, *Electric Machinery*, Sixth Edition, Mc Graw Hill, 2003

LEARNING SPESIFICATIONS

Subject Name: Power Electronics; Code: TKE408; **T:** 2 **sks**; P :0 sks.
Subject Description: This subject contain about of power semiconductors and components of the main circuit such as capacitors and inductors in both sinusoidal and non-sinusoidal conditions. Furthermore, different types of converters (rectifiers, dc/dc converters, inverters, cycloconverter and resonant converters), their operating principles and analytical techniques, practical applications and design of converters. Both self-commutated as well as line-commutated converters are treated. The course also describes different power electronic circuits when ideal conditions are assumed as well as including the actual semiconductor characteristics.
Learning Outcomes: Students will be familiar and aware of how the operating principles of static power converters commonly used in practical industrial systems and power electronic circuits fit in to the practical world. It addresses the underlying concepts and methods behind various applications ranging from low-medium power utility interfaces to high power transmission systems.

No	Learnig Objectives	Topic	Sub-topic	Time (minutes)	References
1	2	3	4	5	6
1	Overview of solid state components and their high power counterparts, power semiconductor devices and their use as switches	1. Introduction	1.1 Development history and basic fungtions of static converter 1.2 System components and semiconductor switches 1.3 Power semiconductor devices	2 X 2 X 50	[1], [2], [3]
2	Having completed this topic discussion, student will be able to design and analysis: single-phase, three-phase rectifier circuits and linear power supplies.	2. **Rectifiers**	2.1 Phase-Controlled Thyristor Converters 2.2 Single phase rectifier circuits 2.3 Three-phase rectifier circuits	2 X 2 X 50	[1], [2]
3	Having completed this topic discussion, student will be able to design and analysis DC-to-DC power electronic converters circuit with voltage control by pulse-width-modulation	3. **DC Choppers**	3.1 Class A 3.2 Class B 3.3 Class C 3.4 Class D 3.5 Class E 3.6 DC Chopper application	3 X 2 X 50	[1], [2]
4	Having completed this topic discussion, student able to design and analysis inverter circuit and PWM modulation.	4. **DC to AC Converter (Inverters)**	4.1 Definition and Properties 4.2 Single phase inverter 4.3 Three-phase inverter 4.4 PWM modulation	3 X 2 X 50	[1], [2]

			4.5 Multilevel inverter 4.6 Inverter application		
5	Having completed this topic discussion, student able to analysis Cycloconverter single and three phase, with resistif or inductif load.	5.**Cycloconverter**	5.1 Single phase Cycloconverter 5.2 Three-phase Cycloconverter 5.3 Cycloconverte with resistif or inductif load	2 X 2 X 50	[1], [2]
6.	Having completed this topic discussion, student able to analysis a resonant converter as a power conditioning system which utilizes a resonant L-C circuit as a part of the power conversion process.	6. Resonant Converter	6.1 Introduction to Resonant Power Conversion 6.2 The Series Resonant Converter 6.3 The Parallel Resonant Converter	2 X 2 X 50	[1], [2]

[1] Mohan N., Undeland T.M. and Robbins W.P., Power Electronics, Converters, Applications and Design, John Wiley and Sons.
[2] Rashid M.H., Power electronics, Circuits, Devices and Applications, Prentice-Hall.
[3] Heumann K., Basic Principles of Power Electronics, Springer-Verlag Heidelberg New-York London Paris Tokyo.

LEARNING SPESIFICATIONS

Subject Name: Digital Processing of Speech Signal (Pengolahan Suara Digital) ; **Code:** TKE118; **T:** 3 **sks**; P :0 sks.
Subject Description: This subject contain about digital modelling of speech signal, speech coding, time-frequency analysis, homomorphic analysis, pitch detection, formant analysis, and applications.
Learning Outcomes: Student able to apply the processing principles speech digitally and make the speech processing algorithm for the application.

No	Learnig Objectives	Topic	Sub-topic	Time (minutes)	References
1	2	3	4	5	6
1	Having completed this topic discussion, student will be able to mention to minimize 2 example of processing applying speech digitally and explain the way of its work	1. Introduction	1.1 Speech Production 1.2 Application of digital speech processing	3 X 50	[1], [2]
2	Having completed this topic discussion, student will be able to make one of model of voice tract, with radiation or excitation	2. Speech Modelling	2.1 Acoustic Theory of Speech Production 2.2 Lossless Tube Model 2.3 Digital Models for Speech Signal	6 X 50	[1], [2]
3	Having completed this topic discussion, student able to calculate the estimation of period of speech signal pitch with the autocorrelation function	3. Time Domain Model for Speech Signal	3.1 Short-time Analysis 3.2 Pitch Period Estimation 3.3 Autocorrelation Function 3.4 Median Smoothing	6 X 50	[1], [2]
4	Having completed this topic discussion, student able to make the program to present the spectogram of speech signal truly.	4. Short-Time Fourier Analysis	4.1 Definition and Properties 4.2 Design of Digital Filter Bank 4.3 Spectographic Displays 4.4 Analysis-by Synthesis	6 X 50	[1], [2]
5	Having completed this topic discussion, student able to make the simulation program of determination of pitch speech signal with the homomorphic method.	5. Homomorphic Speech Processing	5.1 Homomorphic System for Convolution 5.2 Cepstrum 5.3 Pitch Detection 5.4 Formant Estimation	3 x 50	[1], [2]

6.	Having completed this topic discussion, student able to calculate the coefficient of LPC for speech signal truly.	6. Linear Predictive Coding of Speech	6.1 Basic Principles of Linear Predictive Analysis 6.2 Solution of LPC Equations 6.3 Comparasion Between the Methods of Solution of the LPC Analysis Equations 6.4 Application of LPC Parameter	6 x 50	[1], [2]
7	Having completed this topic discussion, student able to make the simulation program to one of the application of digital processing of speech signal	7. Application of Digital Speech Processing	7.1 Speech Response System 7.2 Speech Recognition 7.3 Speech Identification 7.4 Speech Compression	12 x 50	[1],[2],[3]

[1] Lawrence R. Rabiner dan Ronald W. Schafer, 1978, *Digital Processing of Speech Signal*, Prentice Hall, New Jersey.

[2] Ben Gold dan Nelson Morgan, 2000, *Speech and Audio Signal Processing: Processing and Perception of Speech and Music*, John Wiley & Sons, Inc., New York.

[3] L.R. Rabiner dan B.H. Juang, 1982, *Fundamentals of Speech Recognition*, Prentice Hall, New Jersey.

LEARNING UNIT

Subject	**: Digital Processing of Speech Signal (Pengolahan Suara Digital)**
Code	**: TKE118**
Study Time	**: 3 × 50 menit**
Study Week	**: 1**

A. Learning Objectives

1. General

Having completed this subject (by the end of semester), student able to apply the processing principles of speech digitally and make the speech processing algorithm for the certain application.

2. Spesific

Having completed this topic discussion, student will be able to mention to minimize 2 example of application of digital speech processing and explain the way of its work

B. Topic: Introduction

C. Sub-Topic:

1.1 Speech Production
1.2 Application of digital speech processing

D. Learning Activities

Stage	Teacher Activites	Student Activities	Media and Teaching Aid
Introduction	1. Explain items coverage in this first meeting. 2. Explain the relevance of this subject with the prerequisities 3. Explain the spesific objectives of this sub-topic	Having attention and discussion	Slide Power Point + LCD Projector
Explanation	4. Explain the human speech production 5. Explain the digitalization of speech signal and the relevant aspect 6. Give the state-of-the-art of digital speech processing	Having attention Having attention and discussion	Whiteboard Slide Power Point + LCD Projector Demo Program
End Session	7. Close the session a. Discussing some example of digital speech processing applications and invite the student to think the other example which not yet been referred as previously b. Giving related and briefly description about next lecturing items	Having attention and give their ideas	Whiteboard Whiteboard

E. Evaluation

Used instrument: student undertake to formulate a digital voice processing applying according to their ideas and explain the target and also the way of its work

F. Reference

[1] Lawrence R. Rabiner dan Ronald W. Schafer, 1978, *Digital Processing of Speech Signal*, Prentice Hall, New Jersey.

[2] Ben Gold dan Nelson Morgan, 2000, *Speech and Audio Signal Processing: Processing and Perception of Speech and Music*, John Wiley & Sons, Inc., New York.

LEARNING SPESIFICATIONS

Subject Name: Digital Processing of Speech Signal (Pengolahan Suara Digital) ; **Code:** TKE118; **T**: 3 **sks**; P :0 sks.
Subject Description: This subject contain about digital modelling of speech signal, speech coding, time-frequency analysis, homomorphic analysis, pitch detection, formant analysis, and applications.
Learning Outcomes: Student able to apply the processing principles speech digitally and make the speech processing algorithm for the application.

No	Learnig Objectives	Topic	Sub-topic	Time (minutes)	References
1	2	3	4	5	6
1	Having completed this topic discussion, student will be able to mention to minimize 2 example of processing applying speech digitally and explain the way of its work	1. Introduction	1.1 Speech Production 1.2 Application of digital speech processing	3 X 50	[1], [2]
2	Having completed this topic discussion, student will be able to make one of model of voice tract, with radiation or excitation	2. Speech Modelling	2.1 Acoustic Theory of Speech Production 2.2 Lossless Tube Model 2.3 Digital Models for Speech Signal	6 X 50	[1], [2]
3	Having completed this topic discussion, student able to calculate the estimation of period of speech signal pitch with the autocorrelation function	3. Time Domain Model for Speech Signal	3.1 Short-time Analysis 3.2 Pitch Period Estimation 3.3 Autocorrelation Function 3.4 Median Smoothing	6 X 50	[1], [2]
4	Having completed this topic discussion, student able to make the program to present the spectogram of speech signal truly.	4. Short-Time Fourier Analysis	4.1 Definition and Properties 4.2 Design of Digital Filter Bank 4.3 Spectographic Displays 4.4 Analysis-by Synthesis	6 X 50	[1], [2]
5	Having completed this topic discussion, student able to make the simulation program of determination of pitch speech signal with the homomorphic method.	5. Homomorphic Speech Processing	5.1 Homomorphic System for Convolution 5.2 Cepstrum 5.3 Pitch Detection 5.4 Formant Estimation	3 x 50	[1], [2]

6.	Having completed this topic discussion, student able to calculate the coefficient of LPC for speech signal truly.	6. Linear Predictive Coding of Speech	6.1 Basic Principles of Linear Predictive Analysis 6.2 Solution of LPC Equations 6.3 Comparasion Between the Methods of Solution of the LPC Analysis Equations 6.4 Application of LPC Parameter	6 x 50	[1], [2]
7	Having completed this topic discussion, student able to make the simulation program to one of the application of digital processing of speech signal	7. Application of Digital Speech Processing	7.1 Speech Response System 7.2 Speech Recognition 7.3 Speech Identification 7.4 Speech Compression	12 x 50	[1],[2],[3]

[1] Lawrence R. Rabiner dan Ronald W. Schafer, 1978, *Digital Processing of Speech Signal*, Prentice Hall, New Jersey.

[2] Ben Gold dan Nelson Morgan, 2000, *Speech and Audio Signal Processing: Processing and Perception of Speech and Music*, John Wiley & Sons, Inc., New York.

[3] L.R. Rabiner dan B.H. Juang, 1982, *Fundamentals of Speech Recognition*, Prentice Hall, New Jersey.

LEARNING UNIT

Subject	**: Digital Processing of Speech Signal (Pengolahan Suara Digital)**
Code	**: TKE118**
Study Time	**: 3 × 50 menit**
Study Week	**: 1**

A. Learning Objectives

1. General

Having completed this subject (by the end of semester), student able to apply the processing principles of speech digitally and make the speech processing algorithm for the certain application.

2. Spesific

Having completed this topic discussion, student will be able to mention to minimize 2 example of application of digital speech processing and explain the way of its work

B. Topic: Introduction

C. Sub-Topic:

1.1 Speech Production
1.2 Application of digital speech processing

D. Learning Activities

Stage	Teacher Activites	Student Activities	Media and Teaching Aid
Introduction	1. Explain items coverage in this first meeting. 2. Explain the relevance of this subject with the prerequisities 3. Explain the spesific objectives of this sub-topic	Having attention and discussion	Slide Power Point + LCD Projector
Explanation	4. Explain the human speech production 5. Explain the digitalization of speech signal and the relevant aspect 6. Give the state-of-the-art of digital speech processing	Having attention Having attention and discussion	Whiteboard Slide Power Point + LCD Projector Demo Program
End Session	7. Close the session a. Discussing some example of digital speech processing applications and invite the student to think the other example which not yet been referred as previously b. Giving related and briefly description about next lecturing items	Having attention and give their ideas	Whiteboard Whiteboard

E. Evaluation

Used instrument: student undertake to formulate a digital voice processing applying according to their ideas and explain the target and also the way of its work

F. Reference

[1] Lawrence R. Rabiner dan Ronald W. Schafer, 1978, *Digital Processing of Speech Signal*, Prentice Hall, New Jersey.

[2] Ben Gold dan Nelson Morgan, 2000, *Speech and Audio Signal Processing: Processing and Perception of Speech and Music*, John Wiley & Sons, Inc., New York.

1.1.1 LEARNING SPESIFICATIONS

Subject Name : Microprocessor
Code/SKS : TKE 103; **T**(class): 3 **sks**; **P**(Lab): 1 **sks**

Subject Discription This subject contain basic concept of Microprocessor and Microcontroller, hardware and software, interface tehnique, memory map, concept of address decoding, analysis and syntesis circuit of system microprocessor and microcontroller.

Learning Outcomes: Student having ability to understand concept of microprocessor and microcontroller and capable to synthesis and analysis a simple project using system microprocessor and microcontroller, both software and hardware.

No	Learning Objectives	Topic	Sub Topic	Time in minutes	References
1	2	3	4	5	6
1	Having completed this topic discussion, student will be able to explain basic concept microprocessor concept.	1. Introduction	1.1 History of uP 1.2 Technology of uP 1.3 Architecture of uP 1.4 Some kind of uP uP 1.5 uP Development System	3 X 50 (1st week)	[1] [2] [3]
2	Having completed this topic discussion, student will be able to explain ideal model of uP and basic principal of uP (microprocessor) and uC (Microcontroller).	2. Basic of uP and uC	2.1 uP ideal. 2.2 address bus and data bus 2.3 System Control 2.4 Memory Map 2.5 Mapping Memory 2.6 Basic Configuration	6 X 50 (2nd and 3th week)	[1] [2] [3]

3	Having completed this topic discussion, student will be able to explain basic supporting system hardware.	3Supporting System	3.1 Power Supply 3.2 Clock 3.3 Logic Gates 3.4 Latches& Buffers	3 X 50 (4th week)	[1] [2] [3]
4	Having completed this topic discussion, student will be able to read and design of memory map.	4. Address Decoding	4.1 Address Decoding 4.2 Hardware diagram 4.3 Space Memory and Mapping Memory	6 X 50 (5th ,6th week)	[1] [2] [3]
5	Having completed this topic discussion, student will be able to explain type of memory, able to place memory into memory map, making memory work in system microprocessor..	5. Memory	5.1 Type of Memory 5.2 Expanding Memory 5.3 Read & Write Timing 5.4 Memory Interface	6 X 50 (7th ,8th week)	[1] [2] [3] [4] [5]
6	Having completed this topic discussion, student will be able to explain type of Input/Output, placing into memory map and interfacing into microprocessor system.	6. Input Output	6.1 Type of I/O 6.2 Expanding I/O 6.3 Read & Write Timing 6.4 I/O Interface	6 X 50 (9th ,10th week)	[1] [2] [3] [4] [5] [8]
7	Having completed this topic discussion, student will be able to explain Data transfer and signaling in microprocessor system.	7. Data Transfer and Signaling	7.1 Paralel Data 7.2 Serial Data 7.3 Interupt & Polling 7.4 *Direct Memory Access*	6 X 50 (11th ,12th week)	[1] [3] [4] [8]
8	Having completed this topic discussion, student will be able to explain Features, Architecture and performance MCS51 microcontroller.	8. uC MCS51	8.1 Features 8.2 Architecture 8.3 Memory organization 8.4 Bus Control & I/O	3 X 50 (13th ,14th week)	[4]-[13]
9	Having completed this topic discussion, student will be able to build simple application program using assembly languange of microcontroller MCS51.	9. Assembly Language of MCS51	9.1 Compiler 9.2 Basic Programming 9.3 Programming Technique	6 X 50 (15th ,16th week)	[4]-[13]

References

[1] John Uffenbeck, 1985, *Microcomputers and Microprocessors,* Prentice Hall International.
[2] Garland, *Microprocessor System Design,* Prentice Hall.
[3] Roger L Tokheim, *Microprocessor Fundamentals*, Schaum's Outline Series.
[4] Richard H Barnett, PE, PHD, *The 8051 Family of Microcontrollers,* Prentice Hall
[5] Scott Mackenzie, *The 8051 Microcontrollers,* Prentice Hall.
[6] Sencer Yeraland and Ashutosh Ahluwalia, *Programming and Interfacing the 8051,* Addison Wesley Publishing.
[7] Intel Corporation, *MCS51 - Family of the Single Chip Microcomputers User Manual,* Intel 1981
[8] Jan Axelson, *The Microcontroller Idea Book*, Lakeview Research
[9] Intel Corporation, *8 Bit Embedded Controller Handbook,* Intel 1989
[10] www.atmel.com
[11] www.intel.com
[12] www.8052.com
[13] www.epanorama.net

LEARNING SPESIFICATIONS

Subject Name: Power Electronic; Code: TKE4088; **T: 2 sks**; P :0 sks.
Subject Description: This subject contain about of power semiconductors and components of the main circuit such as capacitors and inductors in both sinusoidal and non-sinusoidal conditions. Furthermore, different types of converters (rectifiers, dc/dc converters, inverters, cycloconverter and resonant converters), their operating principles and analytical techniques, practical applications and design of converters. Both self-commutated as well as line-commutated converters are treated. The course also describes different power electronic circuits when ideal conditions are assumed as well as including the actual semiconductor characteristics.
Learning Outcomes: Students will be familiar and aware of how the operating principles of static power converters commonly used in practical industrial systems and power electronic circuits fit in to the practical world. It addresses the underlying concepts and methods behind various applications ranging from low-medium power utility interfaces to high power transmission systems.

No	Learning Objectives	Topic	Sub-topic	Time (minute)	References
1	Overview of solid state components and their high power counterparts, power semiconductor devices and their use as switches	1. Introduction	1.1 Development history and basic fungtions of static converter 1.2 System components and semiconductor switches 1.3 Power semiconductor devices	2 X 2 X 50	[1], [2], [3]
2	Having completed this topic discussion, student will be able to design and analysis: single-phase, three-phase rectifier circuits and linear power supplies.	2. **Rectifiers**	2.1 Phase-Controlled Thyristor Converters 2.2 Single phase rectifier circuits 2.3 Three-phase rectifier circuits	2 X 2 X 50	[1], [2]
3	Having completed this topic discussion, student will be able to design and analysis DC-to-DC power electronic converters circuit with voltage control by pulse-width-modulation	3. **DC Choppers**	3.1 Class A 3.2 Class B 3.3 Class C 3.4 Class D 3.5 Class E 3.6 DC Chopper application	3 X 2 X 50	[1], [2]
4	Having completed this topic discussion, student able to design and analysis: inverter circuit and PWM modulation.	4. **DC to AC Converter (Inverters)**	4.1 Definition and Properties 4.2 Single phase inverter 4.3 Three-phase inverter 4.4 PWM modulation	3 X 2 X 50	[1], [2]

			4.5 Multilevel inverter 4.6 Inverter application		
5	Having completed this topic discussion, student able to analysis Cycloconverter single and three phase, with resistif or inductif load.	5.**Cycloconverter**	5.1 Single phase Cycloconverter 5.2 Three-phase Cycloconverter 5.3 Cycloconverte with resistif or inductif load	2 X 2 X 50	[1], [2]
6.	Having completed this topic discussion, student able to analysis a resonant converter as a power conditioning system which utilizes a resonant L-C circuit as a part of the power conversion process.	6. Resonant Converter	6.1 Introduction to Resonant Power Conversion 6.2 The Series Resonant Converter 6.3 The Parallel Resonant Converter	2 X 2 X 50	[1], [2]

[1] Mohan N., Undeland T.M. and Robbins W.P., Power Electronics, Converters, Applications and Design, John Wiley and Sons.
[2] Rashid M.H., Power electronics, Circuits, Devices and Applications, Prentice-Hall.
[3] Heumann K., Basic Principles of Power Electronics, Springer-Verlag Heidelberg New-York London Paris Tokyo.

LEARNING SPECIFICATION

Subject Name :Optimal Control; **Code: T**: 3 **sks**
Prerequisite(s) :
Subject Description :
This subject contain basic optimal programming concept to certain criteria, potryagin maximum principle, methode of lyapunov 2, linear quadratic methode, regulator problem, tracking systems, sub optimal, discreet system LQR and estimator.

Learning Outcomes :
The student can analysis and design control methode optimaly to choosed linear quadratic performance function

1	Having completed this fundamental subject, the student can explain optimal control basic concept at least 80% precise	1.basic optimal control concept	1.1 Overview of optimal control 1.2 comparison of quadratic optimal control and non optimal 1.3 LQR Problem	6 X 50	[1]: 1-7 [3]
2	Having completed this fundamental subject, the student can complete problem in optimal control, stabilizing theorem, and Potryagin maximum principle at least 80% precise	2. Pontryagin maximum principle and Lyapunov stability theorem	2.1 Pontryagin maximum principle 2.2 Lyapunov stabilition 2.3 Hamilton- Jakoby equality	9 X 50	[1]: 8-34

3	Having completed this fundamental subject, the student can solve regulator problem at least 80% precise	3. regulator standard Problem	3.1 Infinite-TimeStandard Regulator Problem 3.2 Regulator stability	9 X 50	[1]: 35-67
4	Having completed this fundamental subject, the student can solve Tracking Systems at least 80% precise	4. Tracking Systems	4.1 Trajektory problems 4.2 Finite Time Result 4.3 Infinite Time Result	9 X 50	[1]: 68-100
5	Having completed this fundamental subject, the student can solve nature of Regulator dan Weight Selection at least 80% precise	5. nature of Regulator and quadratic weight selection	5.1 Return Difference equality 5.2 Gain Margin and Phase Margin 5.3 inverse Optimal control 5.4 selection of Q and R weight	6 X 50	[1]: 101-140
6	Having completed this fundamental subject, the student can solve Estimator problem at least 80% precise	6. Estimator	6.1 nature of estimation State 6.2 design of deterministic estimator	6 X 50	[1]: 164-206

Reference :

1. Anderson,B.D.M. : "Optimal Control, Linear Quadratic Methods", Prentice-Hall, New Jersey 1989.
2. Lewis,F.L. : " Applied Optimal Control and Estimation ", Prentice-Hall, New Jersey, 1992.
3. Lewis,F.L. : " Optimal Control ", Prentice-Hall, New Jersey, 1995.

LEARNING SPECIFICATION

Subject Name: Antenna; and of Propagation ; Code: TKE110; T: 3 sks; P : 0 sks.
Prerequisite(s) :
Subject Description :
The Subject contain definition and parameters of antenna;, intensity of radiation, point of source, linear antenna;, pattern antenna;, antenna; with reflector and measurement of antenna;.
Learning Outcomes :
The student will be know elementary principles of antenna; and can design it

No	Learning Objectives	Topic	Sub-topic	Time (minute)	Reference(s)
1	Having completed this fundamental discussion, The student can explain elementary concept [of] electromagnetic wave radiation from an conductor correctly.	1.Definition and Parameter antenna	1.1 Definition of antenna 1.2 Radiation Pattern 1.3 Directional and Amplification 1.4 Antenna Field Zone	3 X 50	[1]
2	Having completed this fundamental discussion, the student can mention minimally 2 antenna family and its use.	2. Family Antenna	2.1 Loop, Pattern and Slot 2.2 coacial Antenna 2.3 Antenna of Double strand 2.4 Antenna of Waveguide 2.5 Antenna; with Reflector	3 X 50	[1]
3	Having completed this fundamental discussion, The student can calculate field intensity yielded by point source series	3. Concept Point Source.	3.1 Definition Point Source 3.2 Pattern Field 3.3 series of Point Source	6 X 50	[1]
4	Having completed this fundamental discussion, student can calculate pattern and resistance of pattern radiation of 1 / 2 wave dipole antenna	4 Dipole Antenna	4.1 Short Pattern 4.2 Short Field Pattern 4.3 Short dipole radiation resistance 4.4 Pattern 1 / 2 Wave	6 X 50	[1]
5	Having completed this fundamental discussion, The student could design helices antenna or Yagi	5. Helices Antenna	5.1 Geometry of Helices 5.2 Scheme of Antenna; of Helices 5.3 Pattern with parasite 5.4 Antenna; Yagi	6 x 50	

6	Having completed this fundamental discussion, student could Calculate reinforcement yielded by reflector of parabola	6. Antenna; with Reflector.	6.1 Reflector level off 6.2 Reflector of Angle Corner 6.3 Parabola	3 x 50	[1]
7	Having completed this fundamental discussion, student can depict measurement of antenna; parameter and used equipments.	7. Measurement of Antenna	7.1 Elementary Concept 7.2 Type Mistake of Measurement 7.3 Range Measurement 7.4 Measurement of Parameter Antenna;	6 x 50	[1],[2]
8	Having completed this fundamental discussion, student can mention antenna; characteristic and type used to a real target correctly.	8. Antenna; for Special Application.	8.1 Antenna of Gound-Plane 8.2 Antenna; of Turnstile 8.3 High Omni Gain 8.4 Antenna; for the Communications of Satellite 8.5 Antenna; of ILS 8.6 Antenna; for the Communications of Terrestrial	9 x 50	[1]

Reference

[1] John D. Kraus and Ronald J. Marhefka., 2002, *Antennas: for All Applications*, Mc Graw Hill, New York.

[2] John D. Kraus, 1992, *Antennas*, Prentice Hall, New Jersey.

LEARNING SPECIFICATION

Subject Name : Electrical Drawing ; Code: TKE175 ; T: 1 sks; P: 0 sks
Prerequisite(s) :
Subject Description :
This Subject contain letter and line type; Drawing symbol standard; lighting installation drawing, power installation, lightning installation, installation of sound system, installation of hydrant, installation of telephone and of Nurse Call

Learning Outcomes :
student could be familiar with drawing symbols, reading installation drawing, and draw .

No	Target of Special Instruksional	Fundamental Discussion	Sub-Pokok Discussion	Estimation Time (minute)	Source/ Bibliography
1	Having completed this fundamental discussion, The student could be recognize concept, order and way of presenting drawing.	1. Elementary Concept draw technique.	1.1 Function and nature of Picture 1.2 Kinds of line and letter 1.3 Kinds of appliance draw and its function 1.4 geometric Construction 1.5 Picture three dimension 1.6 Projection picture 1.7 Order picture 1.8 Handling and moderation of picture	4 X 50	[1]:
2	Having completed this fundamental discussion, The student could be recognize and draw kinds of drawing Symbols	2. drawing symbols	2.1 symbols standard 2.2 electronics drawing symbols 2.3 Electrical and mechanical daring symbols 2.4. Sound system drawing symbols	5 X 50	[2]: [3]: [4]

			2.5 hydrant drawing symbols 2.6 installation of telephone and of nurse call drawing symbols		
3	Having completed this discussion the student could be read and draw installation.	3. Picture Installation.	2.1 Regulation of Installation 2.2 Picture electronics 2.3 Picture lighting installation 2.4 Picture energy installation 2.5 Picture Installation and thunder of grounding 2.6. Installation picture of sound system 2.7 Drawing installation of hydrant 2.8 Drawing installation of telephone and of nurse call	7 X 50	[2]: [3]: [4]:

REFERENCE

[1] G Takeshi Sato, N Sugiarto H., 1994: Menggambar Mesin menurut Standar ISO,Pradnya Paramita , Jakarta

[2] ....., PUIL 2000

[3]....., PUIL 1997

[4] P Van Harten, Ir E Setiawan, 1985, Instalasi Listrik Arus Kuat. 1,2,3 Binacipta ,Bandung

LEARNING SPECIFICATION

Subject Name : Digital Image Processing; **Code:** TKE115; **T**: 3 **sks**; P :0 sks.
Prerequisite(s) :
Subject Description : This Subject contain image concept, 2 dimension basic mathematic and digital image algorithm development
Learning Outcomes : Student will be recognize digital image processing concept, algorithm and implementation

No	Learning Objectives	Topic	Sub-topic	Time (minutes)	Reference(s)
1	Having completed this fundamental discussion, The student can minimally mention digital image processing implementation and its general picture	1. Introduction	1.1 Image Concept 1.2 Man vision System 1.3 Vision Phenomenon 1.4 Image Processing Concept	6 X 50	[1],[2]
2	Having completed this fundamental subject, the student can explain digital filter design series for digital image processing	2. Two dimension signals Processing	2.1 Two dimension Basic Math 2.2 FIR and IIR digital filter design 2.3 Spectrum Estimation	6 X 50	[1],[2]
3	Having completed this fundamental subject, the student can find fast fourier transform coefficient accurately	3. Discreet Fourier transformation	3.1 Discreet fourier Series 3.2 Discreet fourier transformation 3.3 discreet cosinus transformation 3.4 Fast fourier transform	6 X 50	[1],[2]
4	Having completed this fundamental subject, the student can develop image enhancement algorithm correctly	4. Image enhancement	4.Point operation 4.2 Histogram modeling 4.3 space operation 4.4 transformation operation	9 X 50	[2]
5	Having completed this fundamental subject, the student can encode image correctly	5. Image encoding	5.1 quantisation 5.2 Wave form encoding 5.3 Transformation encoding 5.4 Image model encoding	6 x 50	[2]

6.	Having completed this fundamental subject, the student can develop simulation program for one of image processing correctly	6. Image processing algorithm	6.1 Space ekstraction 6.2 edge detection 6.3 Noise reduction 6.4 image compression	12 x 50	[1]

Reference

[1] Anil K. Jain, 1989, *Fundamentals of Image Processing*, Prentice Hall, New Jersey.

[2] Jae S. Lim, 1990, *Two-Dimensional Signal and Image Processing*, Prentice Hall, New Jersey

LEARNING SPECIFICATION

Subject Name :Algorithm and Data Structure; Code: TKE 300; T: 3 sks
Prerequisite(s) :
Subject Description : This Subject contain algorithm Concept and Data structure of Programming
Learning Outcomes : Student will be able to recognize and can use algorithm to solve problems using computer program

1	Having completed this fundamental discussion, The Student will be able to conduct step by step of simple algorithm and calculating its performance at least 80% precise	1. Accessing Algorithm	1.1. Definition of Algorithm 1.2. Modification of Algorithm 1.3. Measurement of performance	2 x 50	[1] 1 – 12 [2] 1-29
2	Having completed this fundamental discussion, the student will be able to define Linked List, Stack and Queue in a trouble-shooting algorithm at least 80% precise	2. Structure of basic data.	2.1. Linked List 2.2. Stack 2.3. Queue	2 x 2 x 50	[1] 13-50 [2] 37-64
3.	Having completed this fundamental discussion, The student will be able to define concept of hash and 3 type of hash in a trouble-shooting algorithm at least 80% precise	3. Hash	3.1. Concept of Hash 3.2. Function of Hash 3.3. Linear of Has 3.4. Non Linear of Hash 3.5 is. External [of] Chaining	2 x 2 x 50	[1] 63 – 93 [2] 122 - 135
4.	Having completed this fundamental discussion, The student will be able to define concept of searching and 4 type of search in trouble-shooting algorithm at least 80% precise	4. Search	4.1. Characteristic of Search 4.2. Brute Force Search 4.3. Boyer Moore Search 4.4. Search Multiple 4.5. Comparison	2 x 2 x 50	[1] 95 – 171

5	Having completed this fundamental discussion, The student will be able to define concept of sorting and 10 type of sorting in trouble-shooting algorithm at least 80% precise	5. Sorting	5.1. characteristic of Search 5.2. Model of Sort : Bubble, Insert, Shell, Quick, Heap 5.3. combination with list linked 5.4. Sorting with key multiple	2 x 2 x 50	[1] 173 – 243 [2] 253 - 286
6	Having completed this discussion fundamental, The student will be able to define concept of tree and 4 type of tree in trouble-shooting algorithm at least 80% precise	6. Tree	6.1. Binary tree 6.2. Red Black tree 6.3. Tree Splay 6.4. Tree B 6.5. Implementation	2 x 2 x 50	[1] 245 – 361
7.	Having completed this fundamental discussion, The Student will be able to define concept of directed and of undirected graph in trouble-shooting algorithm at least 80% precise	7. Graph	7.1. Definition of Graph 7.2. Representation of Directed Graph 7.3. Representation of Undirected Graph	2 x 2 x 50	[2]198-246
8	Having completed this discussion fundamental, The student will be able to define concept of data compression and its implementation at least 80% precise	8. Data Compresion	8.1. Run Length Encoding 8.2. Huffman Compression 8.3. LZW 8.4. Other compression	2 x 50	[1] 535 -570

Reference.

[1] Andrew Binstock, John Rex, " Practical Algorithms for Programmers", Addison Welley Publishing, 1995

[2] Alfred V Aho, John E Hopcroft, Jeffrey D Ullman, "Data Structur and Algorithms" Addison Welley Publishing,