

File No Book No 28



2010
Communication Electronics

Name Electronics 'Y'

Subject _____

Section 56

RAJIV GANDHI PROUDYOGIKI VISHWA VIDYALAYA

(University of Technology of Madhya Pradesh)

AIR PORT BY PASS ROAD BHOPAL-462036

PHONE : [0755] 2742001, 2742003, FAX : 0755-2742002

M.P. Board of Technical Education
Bhopal (M.P.)

original
28/11

CURRICULUM
OF
FINAL YEAR DIPLOMA IN ELECTRONICS
(Y-SCHEME)
IN

COMMUNICATION ELECTRONICS

1996
REVISED
BY

POLYTECHNIC DEVELOPMENT UNIT, BHOPAL
(An Indo-German Project)

UNDER

Directorate of Technical Education, M.P.
Bhopal

Output
Input
Out put
Out put + lesson

COMMUNICATION ELECTRONICS

28/2

FIFTH SEMESTER

ECY301	LINE COMMUNICATION
ECY302	TV & VIDEO TECHNIQUES
ECY303	MICRO-PROCESSOR APPLICATION IN COMMUNICATION ELECTRONICS
ECY304	ANTENNA & MICRO TECHNIQUES
ECY309	PROJECT WORKSHOP (ENTREPRENEURSHIP)

Curriculum plan for 16 weeks.
 Total Hours per week : 36
 Total Hours: 576 Hrs.

M.P. BOARD OF TECHNICAL EDUCATION, BHOPAL
 FINAL YEAR DIPLOMA PROGRAMME IN COMMUNICATION ELECTRONICS (Y - SCHEME)
 FIFTH SEMESTER
 (To be introduced in 1996-97 at PDU beneficiary Polytechnics)

S.No.	NAME OF SUBJECT	SCHEME OF STUDY			SCHEME OF EXAMINATION										
		CONTACT HRS. PER WEEK (SEMESTER)			SESS. MKS (PROG. ASSM)				BOARD EXAMINATION						
		THEORY	LAB.	TOTAL	TERM WORK	LAB. WORK	I	II	THEORY PAPER	DURA-TION	MKS	PRAC-TICAL	DURA-TION	MKS	REMARK
EDY301	LINE COMMUNICATION	4 (64)	4 (64)	8 (128)	20	35	10	10	1	3 Hrs	100	1	3 Hrs	50	
EDY302	TV & VIDEO TECHNIQUES	6 (96)	4 (64)	10 (160)	20	35	10	10	1	3 Hrs	100	1	3 Hrs	50	
EDY/ IEY303	MICROPROCESSOR APPLICATION IN COMMUNICATION ELX.	4 (64)	4 (64)	8 (128)	20	35	10	10	1	3 Hrs	100	1	3 Hrs	50	
IEY304	ANTENNA & MICROWAVE TECHNIQUES.	6 (96)	4 (64)	10 (160)	20	35	10	10	1	3 Hrs	100	1	3 Hrs	50	
TOTAL		20 (320)	16 (256)	36 (576)	80	140	40	40	4	-	1400	4	-	200	

NOTE: (1) No. of theory paper : 4
 (2) Total theory marks : 400
 (3) No. of practicals : 4
 (4) Total Pract. Marks : 200
 (5) Inplant Training Mks.: -
 (6) Total Mks. of sessional : 500
 Prog. Assessment, Pract. & Inplant Training.

(7) Ratio of theory marks : 400/500
 and (Sessional+Prog. Assess., -Practical+Inplant Training marks.

(8) Total Marks : 900

(9) Passing marks for:
 (a) Theory - 33%
 (b) Practicals - 40%
 (c) Sessionals - 60%
 (d) Inplant Training - 50%

KC Mahajan
 29.6.96
 KC Mahajan

[Signature]
 29/6/96

[Signature]
 29.6.96
 S. V. D. DWA
 DGM (WEP),
 B.M.E.L., BHOPAL

28/4

28/4

Final Year Diploma in Electronics Engineering (Y-Scheme)

Subject/Course : LINE COMMUNICATION
Code : ECY-301

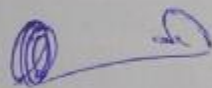
Rationale :

The subject line communication has its importance in the existing curriculum. Since it deals with data communication, electronic exchanges, modems etc.

The course aim is that the diploma engineer gain knowledge about older existing system and new systems using digital switching and to develop skill to use, monitor, test and maintain these systems, so that their job potential can fulfill the employment demand of organisations such as P & T department, overseas communication system and international communication sectors.

The course covers the concept of electronics exchanges, telephone switching techniques and modes of operation. It covers the data switching and new means of communication.

K. S. Srinivasan
29/6/96



28/5

Final Year Diploma in Electronics Engineering (Y-Scheme)

Subject/Course : LINE COMMUNICATION

Code : ECY-301

Scheme of Studies (Hrs. distribution):

S.No.	Topic	Hrs. Distribution		
		Theory	Practical	Total
1.	Introduction to Communication.	06	02	08
2.	Fundamentals of Wire Telephony.	15	05	20
3.	Fundamentals of Electro-Exchange.	10	10	20
4.	Pulse Code Modulation.	10	10	20
5.	Basic Principles of SPC Exchanges.	15	10	25
6.	Data Communication.	15	20	35
Total		71	57	128

Table of Specification for Assessment :

No.	Topic	K	C	A	T
1.	Introduction to Communication.	5	5	-	10
2.	Fundamentals of Wire Telephony.	7	7	-	14
3.	Fundamentals of Electro-Exchange.	4	7	5	16
4.	Pulse Code Modulation.	2	2	5	09
5.	Basic Principles of SPC Exchanges.	6	10	10	26
6.	Data Communication.	10	10	5	25
Total		34	41	25	100

28/6

Subject: Line Communication

Code :

S.No.	Topic/Sub Topic	Intended Learning Outcome (ILO)	Remarks
1.	Introduction to Communication	* Student should be able to; understand the principle, kinds and applications of communication system.	Reference book Telecommunications Systems & Applications by W. Mitchell R. Hendricks L. Sterry Jaico Pub. House.
1.1	Meaning of Communication		
1.2	Kinds of Communication	- Define the term 'communication' - Explain person-to-person Communication	
	- Verbal and nonverbal - Machine Communication	- Verbal and nonverbal - Machine Communication	
1.3	Purpose of Communication	- Know the communication as a means of:	
	- information - persuasion - entertainment - education - control	- information - persuasion - entertainment - education - control	
1.4	Concepts of Telecommunication Technology.	- Draw the block diagram of a general communication system. - Explain the concept of	
	- Encoding - Transmission - Channel - Reception - Decoding	- Encoding - Transmission - Channel - Reception - Decoding	
2.	Fundamentals of Wire Telephony	Understand the principle & use of wire telephony. - Distinguish between wire and wireless communication.	
2.1	Frequency range used for Telephony.	- write frequency range required for speech. - write frequency range required for music.	Reference book Electronic Communication Electronic Communication - by D. Roddy & J. Coolen Prentice Hall of India Pvt. Ltd. New Delhi.

Handwritten signature

Handwritten signature

28/7

- 2.2 Voice/Audio Signal parameters
- Sound pressure level
 - Sound intensity
 - Loudness
 - Loudness level
 - Pitch & frequency
 - Sound distortion
- Define:
- Sound pressure level
 - Sound intensity
 - Loudness
 - Loudness level
 - Pitch & frequency
 - Sound distortion
- 2.3 Telephone Instruments
- microphone
 - loud speaker
 - hand set (telephone transmitter and receiver)
 - dial switch
 - AC ringer
 - Anti side tone induction coil
 - telephone set.
- Define "Electro-Acoustic transducer"
- Describe the following
- microphone
 - loud speaker
 - hand set (telephone transmitter and receiver)
 - dial switch
 - AC ringer
 - Anti side tone induction coil
 - telephone set.
- 2.4 Telephone circuits
- Simplex/duplex
 - subscriber's loop
 - transmission bridges
 - two wire repeater
 - four wire transmission
- Explain the meaning and function of
- simplex circuit
 - duplex circuit
- Draw and describe :
- telephone subscriber's loop circuit
 - transmission bridges (simple bridge and transformer bridge)
 - four-wire terminating set
 - two-wire repeaters
 - four-wire transmission
 - Write the specific use of each circuits.
- 2.5 Telephone switching/Techniques
- Electro-mechanical switching
 - Electronic switching
 - Analog switching
- * Understand various techniques of telephone switching and its uses.
- Describe in brief the following
- step-by-step switching
 - cross bar switching
 - Differentiate between analog and digital switching.
 - Switching matrix (rectangular and traingular)

[Handwritten signature]

[Handwritten mark]

28/8

- Switching network (2-stage and 3-stage network)

- Digital Switching techniques

- Explain the following
 - Time and space switching
 - digital space switching
 - digital time switching
 - 2-dimensional switching

3. Fundamentals of Electronic Exchange.

Understand the functioning, characteristics and application of Electronic exchange.

- Enlist the limitations of manual switching.

Reference
Fundamentals of Electronic Exchanges - by Circle Telecomm. Training Centre Bhopal.

3.1 An overview of Manual Exchange

- Distinguish between manual and automatic exchange.

3.2 Introduction of Electronic Exchange.

- Write the advantages of electronic exchange over electro-mechanical exchange.
- Enlist the facilities provided by Electronic Exchanges.

3.3 Chronological development of Electronic Exchanges.

- Know the name and capacity of various model of electronic exchanges developed.

4 Pulse Code modulation

Understand the PCM techniques, its use in telephony.

Reference
FEE
- by CTTC Bhopal.

4.1 Introduction

- Explain the necessity of PCM technique in telephony.

4.2 Multiplexing Techniques

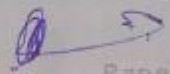
- Describe the principle of
 - . Frequency Division Multiplexing
 - . Time Division Multiplexing

4.3 PCM system

- Basic requirements of PCM system.

- Enlist and explain the following processing steps used in PCM system.
 - filtering
 - sampling

[Handwritten signature]



28/3

- PCM-30 system
 - quantization
 - encoding
 - Line coding
- Give the structure of frame of 30 channel PCM system
- Calculate the bit rate of this system.
- 5 Basic principles of SPC Exchanges.
 - 5.1 Introduction
 - Describe the features of SPC exchange.
 - Reference exchange.
FEE
- by CTTC Bhopal.
 - 5.2 Block diagram of SPC Exchange
 - Draw the block schematic of SPC Exchange.
 - 5.3 Working of SPC Exchange
 - Describe the following:
 - . terminal equipment
 - . switching peripheral
 - . signalling interfaces
 - . data processing peripheral
 - 5.4 Telephone Signalling
 - Telephone signals
 - Addressing modes
 - Explain the term 'telephone signals'
 - Write the short note on:
 - . call Request and Release information
 - . selection (Address) information
 - . End-of-selection information
 - . Supervisory Information
 - Enlist the various steps required for a typical call connection sequence.
 - Specify the Ring back tone, Busy tone.
 - Describe the Address signal generator (Dialling methods)
 - Call connection
 - Subscriber Line Signalling
 - Calling subscriber line signals

28/10

- Called Subscriber Line Signals

- Pulse (Decadic) Dialling.
- Multi frequency push button (Tone) Dialling.
- Write the advantages of DTMF

6 Data communication Telegraphy

- Describe
 - . Ring Signal
 - . Answer signal
 - . Release signal

Understand the principle, working and application of various machines using digital switching.

6.1 Introduction

- Define the term telegraphy.

- Distinguish between telephony & telegraphy.

Reference
Principle of
Telegraphy
- by H.N. Biswas.

- Telegraphic codes

- Explain the basic characteristics of;
 - . Morse code
 - . Cable code
 - . Fine circuit code

- Telegraph speed

- Define
 - . Baud
 - . WPM
 - . Fundamental frequency of signalling.

6.2 Teleprinter

- Teleprinter & Telex

- Draw the block diagram of teleprinter
- Explain the function of each block.

- Telex

- Describe
 - . tele networking
 - . numbering scheme
 - . subscriber set
 - . call establishment

28/11

6.3 FAX

- Distinguish between telex & telephone exchange.

- Explain the principle of a FAX machine.
- Draw block diagram of FAX machine
- Write advantages and disadvantage of FAX over telegraphy.

- Facilities of FAX machine

Describe various facilities available in FAX machine.

- General
- Copying
- pooling
- encryption of a data
- report states etc.
- Advance memory
- time program
- setting fax to receive document and telephone automatically.
- changing the inquiry
- self diagnosis features

- General
- Copying
- pooling
- encryption of a data
- report states etc.
- Advance memory
- time program
- setting fax to receive document and telephone automatically.
- changing the inquiry
- self diagnosis features

- Precaution

- Write the precaution during FAX operation

- Trouble shooting

- How do you trouble shoot a FAX machine.

6.4 E-mail

- Introduction limitation of fax.
- Basic concept
- Operation modes
- Use of E-mail in data communication.

- Explain basic operation of E-mail with schematic diagram
- Describe the various operational modes of E-mail.
- Explain the use of E-mail in data communication.

K C M H 29/6/96



28/12

Final Year Diploma in Electronics Engineering (Y-Scheme)

Subject/Course : LINE COMMUNICATION
Code : ECY-301

List of Pracicals:

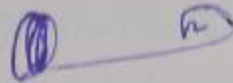
1. Study of Electronic telephone exchange in reference to its operation, various controls, switching and dialling techniques.
2. Study of operation of FAX machine and its controls.
3. Study of Telex and E-mail with reference to operation and use.
4. Study various address modes in telephone signalling.
5. Study various faculty of FAX machine and troubleshooting.
6. Study various component of handset telephone instrument
7. Study various telephone circuits.
8. Study of PCM technique.
9. Study of teleprinter
10. Study various telegraphic instruments.

Handwritten signature and date: 29/12/96

List of books:

1. Training manuals from Telecomm training centres.
2. Operational manuals of FAX and E-mail.
3. Telegraphy and telephony
by: Das and Biswas - Willey Eastern Publication
4. Electronic Communication systems - by Kennedy - TMH Publication.
5. Introduction to telephony & telegraphy - by E.H. Jolly (Wheeler)
6. Electronic Communication - by Dennis Roddy & Coolen - PHI

✓ copy ✓
29/4/96



28/14

Final Year Diploma in Electronics Engineering (Y-Scheme)

Subject/Course : TV & VIDEO TECHNIQUES
Code : ECY-302

Rationale:

The aim of the course TV/Video techniques is to provide the basic knowledge of TV transmission and reception circuits and to develop the skill to operate, monitor/control, test, align and to troubleshoot/maintain the TV circuits at transmitter and receivers.

For the student of communication engineering the inside of the TV's and video cameras and other related devices has to be studied. This course fulfill the job requirement in TV/video industries and communication media centres.

The course covers basic fundamentals of TV system and circuits. It also covers practical applications and troubleshooting / servicing of TVs. The emphasis is given on practicals oriented technique.

J. C. M. 28/6/96



28/15

Final Year Diploma in Electronics Engineering (Y-Scheme)

Subject/Course : TV & VIDEO TECHNIQUES
Code : ECY-302

Scheme of study (Hrs. distribution) :

S.No.	Topic	Hrs. distribution		
		Theory	Practical	Total
1.	TV fundamentals	06	-	06
2.	Monochrome TV transmission	08	06	14
3.	Monochrome TV reception	10	12	22
4.	Colour TV transmission and reception	10	14	24
5.	TV cameras and picture tubes.	06	06	12
6.	Video recorders	10	15	25
7.	Multimedia as an application of computer in TV/video	10	10	20
8.	Latest development in TV devices.	04	01	55
Total		64	64	128

Table of specifications for Assesment:

S.No.	Topic	K	A	C	T
1.	TV fundamentals	6	2	-	8
2.	Monochrome TV transmission	5	4	-	9
3.	Monochrome TV reception	5	5	2	12
4.	Colour TV transmission and reception	-	10	2	12
5.	TV cameras and picture tubes.	2	8	4	14
6.	Video recorders	-	5	5	10
7.	Multimedia as an application of computer in TV/video	2	4	8	14
8.	Latest development in TV devices.	-	2	5	7
Total		22	44	34	100

[Signature]
29/6/96

[Signature]
29/6/96

[Signature]

28/16

Subject: TV & VIDEO TECHNIQUES

Code : ECY-302

S.No.	Topic	Intended Learning Outcome (ILO)	Remark
1	TV fundamentals	Understand the TV fundamental & various process involved in it.	
1.1	Requirements & standards - Introduction to TV - TV system & standards - TV channels - TV parameters	<ul style="list-style-type: none"> - Explain the basic TV system with different blocks. - List different standards adopted in India & other countries. - Draw and explain how channel bandwidth of TV signal is determined. - Enlist various factors which determines the video bandwidth & define them. 	
2	Monochrome TV transmission		
2.1	Fundamentals - Scanning - Blanking & synchronising pulses. - Composite video signal - Positive & negative transmission	<ul style="list-style-type: none"> - Draw the block diagram of monochrome TV transmitter - Explain the functioning of each block - explain the scanning process - Differentiate between horizontal & vertical scanning. - Define interlace ratio. Explain the advantages of interlacing scanning over sequential scanning. - Explain blanking & synchronising pulses and their application in TV. - Differentiate between pre & post equalising pulses used in vertical synchronisation. - Draw & explain composite video signal - Explain the difference between the positive & negative modulation of video signal. - Explain why negative modulation is preferred over positive. 	<p><i>Handwritten notes:</i> <i>2/2/22</i> <i>SK</i></p>
3	Monochrome reception		
3.1	Introduction	<ul style="list-style-type: none"> - Explain the overall functioning of monochrome TV receiver. - Draw the block diagram of a typical monochrome TV receiver. - Draw & explain the working of various stages of a monochrome TV receiver. 	<p><i>Handwritten scribble</i></p>

28/17

- 3.2 Typical circuits of various stages like tuner, IF amplifier, Synchronizer, detector (video of sound) AGC etc.
 - Explain the method of generating EHT in TV receiver.
- 3.3 Testing & alignment of monochrome TV.
 - Differentiate between H-detection & V-detection system.
- 3.4 Troubleshooting & servicing of monochrome TV's.
 - Write the procedure for testing/alignment of various stages of a black & white TV set.
 - Enlist standard faults occur in a black & white TV set & write the fault finding procedure.
 - Name the equipment used for TV servicing/alignment & repair.
- 4 Colour TV transmission & reception.
 - 4.1 Colour theory
 - Colour mixing
 - 4.2 Block diagram with PAL coder
 - Frequency interleaving
 - Colour subcarrier
 - . PAL decoder
 - . NTSC & SECAM
 - 4.3 Testing/alignment in colour TV receiver
 - Define primary colours. How other colours are generated?
 - Draw the block diagram of PAL coder
 - 4.4 Troubleshooting & servicing of colour TV sets.
 - Explain the principle of frequency interleaving.
 - Explain, how colour subcarrier is generated.
 - Draw schematic block diagram of decoder
 - Differentiate between NTSC & SECAM
- 5 TV cameras and picture tubes
 - 5.1 Principle of vidicon, plumbicon, CCD's & wide band camera tubes.
 - Write the procedure for testing/alignment of various stages of a colour TV set.
 - Enlist standard faults occur in a colour TV set & write the fault finding procedure.
 - Name the equipment used for TV servicing/alignment & repair.
 - 5.2 Monochrome picture tubes
 - Explain the principle of various camera tubes & picture tubes.
 - Explain the principle of camera tubes.
 - Write the constructional details of vidicon
 - Write notes on CCD & wide band camera tubes.
 - Draw & explain the working of monochrome picture tube.
 - What is "Aquadag"?
 - Differentiate between PIL & delta tubes.

K. K. K.
29/16

28/18

6. Video recorder

- Basic building block of VCR including both Mechanical & Electronic
- 1) Mechanical:
 - Tape loading system & unloading.
 - Function of MODE selector switch in cassette loading system.
 - Reverse & Forward mechanism.
 - Function of capstan, pinch roller for linear tape

Understand the basic principle of VCR & Write its features & method of video recording.

- Draw basic building block of VCR. Write the function of each block.
- Sketch and explain, how tape is loaded and unloaded in VCR's.
- Explain the function of mode selector switch in VCR.
- What are function of reverse and forward mechanism.
- Write the function of the following
 - . capstan
 - . pinch roller

Student should be demonstrated detailed functioning and operation of VCR and its components in the lab.

7. Multimedia as an application of Computer in TV/Video

- Concept of multimedia
- Linking process of TV with computer.
- Concept of sound blaster
- Concept of video blaster
- Loading of picture using VCR
- Picture mixing using computer
- Picture handling
- Computer animation concept

Understand the application of computer in the field of TV & video as multimedia.

- Explain the meaning of multimedia
- Describe the linking process of TV with computer.
- Explain the concept of sound blaster.
- Differentiate between sound & video blaster.
- Write the loading procedure of video blaster.
- Explain picture mixing & picture handling with the help of video blaster.
- Explain basic principle of animation
- Draw basic building block diagram of VCR. Write the function of each block.
- Draw & describe the VHS system of VCR
- Explain how video tube is loaded & unloaded in VCR.
- Write the function of mode selector switch in cassette loading.
- Differentiate between reverse & forward mechanism.
- Write the function of capstan & pinch roller for linear tape.
- In list front pannel control of advance VCR. Write function of each.
- Explain the functioning of

Student should be exposed to applicatio of computers in TV/Video as multi-media and demonstrate the animation.

Handwritten signature

Handwritten scribble

28/19

Latest developments in TV devices

- Projection TV
- LCD TV
- Calander TV
- Long persistence TV
- PIP TV's
- FST
- Sorround sound in TV

- Know about the latest developments in TV Engineering.
- Differentiate between projection & LCD TV devices.
- Write short notes on the following devices
 - . Calender TV
 - . Long persistence TV
 - . PIP TV's.

Students should be exposed to new developments in TV devices.

Handwritten signature
29/19



Final Year Diploma in Electronics Engineering (Y-Scheme)

28/20

Subject/Course : TV & VIDEO TECHNIQUES
Code : ECY-302

Practical list:

1. Familiarization with consumer and technician control & Safety precautions.
2. Identifications of different components and section in TV receiver (B/W & colour).
3. Signal injection and signal tracing in black and white & colour TV.
4. Voltage and waveform measurements of signal.
5. Alignment of RF,VIDIF and SIF sections.
6. Study of composite video signal.
7. Colour TV adjustments-Gray scale tracking,colour killer, Focus, chroma traps,sound traps,saturation control,black level.
8. Familiarization with specification,operation and use of TV set equipment.-DVM,TVM,monochrome & colour pattern generators, sweep generator,X-Y,display webbuloscope etc.
9. Testing TV antenna and booster.
10. Testing and troubleshooting of VCR's for simple faults.
11. Study of multimedia & animation.
12. Study of various video cameras and its controls.

K. Sankar 2/16

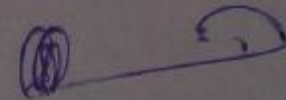


28/21

List of reference books:

1. Colour TV troubleshooting - RC Vijay
2. Basic TV: Theory and servicing - Zbar - TMH Pub.
3. Colour TV and video technology Principles & Applications
by: AK Mani - CBS Pub.
4. Basic TV transmission and reception
by: A.K. Mani - CBS Pub.
5. Television Engineering by: A.K. Dhake - TMH Pub.
6. Servicing Home video cassette recorders
by: Hobbs M.
7. Monochrome and colour TV - by: R.R. Gulati - Welley Pub.
8. Cable Television - by: Maynard

[Handwritten signature]



28/22

Final year Diploma in Electronics Engineering (Y-Scheme)
(Common for Electronics Communication and Industrial electronics)

Subject/Course : MICROPROCESSORS & APPLICATION
Code : EGY/IEY-303

Rationale:

Microprocessor by now have entered in many industrial automation and the number of their applications is increasing rapidly. The use of microprocessor is popular because of its reliability, cheaper in cost, less power consumption, ruggedness & flexibility.

With the introduction of microprocessor a new dimension is provided for digital systems, control systems, designing and diagnostics.

In recent years lot of work has been done on the advancement of microprocessor architecture, application and its communication. It is required to keep pace with this rapid changes. Keeping in view the above the course is designed to acquaint the student with:

- 8 bit, 16 bit, 32 bit, 64 bit microprocessor.
- Present trend of "Microprocessor in industrial application".
- Microprocessor capabilities & limitation
- Microprocessor application in automation etc.

Handwritten signature and date: 29/6/96



28/23

Final year Diploma in Electronics Engineering (Y-Scheme)
(Common for Electronics Communication and Industrial electronics)

Subject/Course : MICROPROCESSORS & APPLICATION
Code : ECV/IEY-303

Scheme of Studies:

S.No.	Topic	Theory	Practical	Total
1.	Architecture & Programming of 8086/8088.	20	16	36
2.	Microprocessor based data acquisition.	08	08	16
3.	Direct memory address and DMA controllers.	05	04	09
4.	Arithmetic co-processors	04	02	06
5.	Other Microprocessors.	07	02	09
6.	Microprocessor Applications.	20	32	52
Total		64	64	128

Table of specification for assessment:

S.No.	Topic	K	C	A	Total
1.	Architecture & Programming of 8086/8088.	12	06	10	28
2.	Microprocessor based data Acquisition.	04	02	04	10
3.	Direct Memory address and DMA controllers.	04	04	02	10
4.	Arithmetic co-processor	03	01	02	06
5.	Other Microprocessor	05	02	02	09
6.	Microprocessor Application	10	11	16	37
Total		38	26	36	100

- Knowledge level C - Comprehension level A - Application level

Handwritten signature

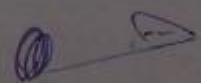
Handwritten mark

Handwritten signature

28/24

S.No.	Topics/Sub-Topics	Intended Learning Outcome (I.L.O.)	Remarks
1	2	3	4
1	<u>Architecture & programming of 8086/8088.</u>	The student will be able to :	
1.1	Intel 8086/8088 Hardware specification.	<ul style="list-style-type: none"> * Draw pin diagram of 8086/8088 - Describe the function of 8086/8088 pins. - Describe Logic diagram;Block diagram and Registers - Draw schematic diagram to connect Buffers/Latches to Address and Data Buses. - Draw timing diagram for READ/WRITE bus cycle. - Explain and Interpret the timing diagram. - Describe WAIT/READY state. - List out the mode of operation of 8086 and 8088. - Distinguish "Min" & "Max" mode of operation. 	
1.2	Memory Interface.	<ul style="list-style-type: none"> * Explain the need of memory interfacing in a Microprocessors. - List out various SRAM,DRAM and ROM ICs and identify them. - Decode Memory Addresses. - Use/connect outputs of decoder to select various memory components. - Define Programmable Address Decoders and uses to decode Memory Address. - Explain RAM/ROM interface to 8086/8088 - Interface memory to 8/16/32 bit Data Bus. 	<ul style="list-style-type: none"> * Demonstrate various many to one decoders (which is already been covered in DIGITAL) - Review of commonly used 8086 instructions and programming techniques.

X. C. M. H.



28/25

- 1.3 Basic I/O Interface
 - * Explain Basic I/O Interfacing.
 - Define "Hand-shaking".
 - Explain the hand-shaking with I/O devices.

- 1.3.1 Peripheral Programmable Interfacing 8255 (PPI)
 - * Draw the pin diagram of 8255 (PPI)
 - List out the various modes of operation of (PPI) 8255.
 - Assign I/O ports and write control word.
 - Interface and programme for 8255.
 - * Demonstrate Interfacing program for stepper motor controller/ 7-segment display etc. or any such.

- 1.3.2 Programmable keyboard/Display controller 8279.
 - * Draw the pin diagram of 8279 and explain the function of each pin.
 - Explain the need of keyboard interfacing and display interfacing.
 - Work-out control word and programme for interfacing.
 - * Demonstrate Interfacing for keyboard (Alpha-numeric) and display.

- 1.3.3 Programmable Serial Communication Interface 8251-A
 - * Define Synchronous & Assynchronous Serial/data.
 - Define the concept of UART and its function.
 - Draw schematic block diagram of 8251-A and its pin diagram.
 - Identify individual bits in Asynchronous & Synchronous instruction word.
 - Explain the functional detail of 8251-A pin.

- 1.3.4 Programmable Counter/Interval Timer 8253/8254.
 - * Draw the pin diagram & schematic diagram of 8253/8254.
 - Describe the function details of pin.
 - List out various operational modes of 8253/8254.
 - Describe each mode of operation.
 - Define control word register and identify each bit of the CWR.

- 2 Microprocessor Based Data Acquisition system.
 - * Define the Data-Aquisition systems and justify its utility in industry.

X cmvkr



2.1 Analog to Digital Converter (ADC).

- * Explain the need of conversion of Analog signal to Digital form.
- List out various ADC ICs.

* ADC 0800, 0803, 0808, 0830 etc.

2.2 Digital to Analog conversion.

- * Explain the need of Digital to Analog conversion of signals.
- List out various DAC ICs.

3. Direct Memory Address and DMA controllers.

- * Describe Direct Memory Address operation
- Explain its need in application.
- Explain DMA request and acknowledge to and from a Microprocessor.

3.1 DMA controller IC 8237

- * Draw the pin diagram of 8237 DMA.
- Draw schematic block diagram of 8237 and explain.
- Enlist various registers in 8237 in 8237 DMA
- Enlist the application of 8237 DMA/8237 DMA.

3.2 Bus operation of DMA

- * Describe Multitasking and Distributed system.
- Define the various buses. (i.e. Local Bus, Shared Bus etc.)
- Draw a block diagram showing local and shared buses.

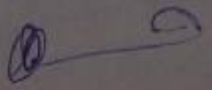
4. Arithmetic co-processor

- * Describe Arithmetic Co-processor and its need in computer.
- List out the advantages of arithmetic co-processors.
- Convert data between decimal and data type allowed for arithmetic co-processor.
- Distinguish the BCD and Floating point Numbers.

4.1 Architecture of 80287

- * List various Arithmetic co-processor ICs.
- Draw pin diagram of 80287.
- Describe pin definition of 80287.
- Draw and explain the internal schematic diagram of 80287.
- List out various Registers in 80287

X copy 29/5/96



28/27

5. Other Microprocessors.

5.1 80186/80188 and 80286 Microprocessor.

- * State the hardware and software enhancements of 80186/80188 compared to 8086/8088.
- Draw internal schematic diagram of 80186 and 80286.

5.2 80386 and 80486 Microprocessor

- * Enlist the various advance features of 80386 and 80486 over previous Microprocessor family.
- Distinguish 80386-SX and 80386-DX
- Distinguish 80486-SX and 80486-DX.

5.3 21108 Z-80

- * Enlist various Registers in Z-80 and its functionalities.
- List out various flags available in Z-80.
- List out various similarities and dissimilarities between Z-80 and 8085 Microprocessor.

5.4 MOTOROLA 6800/68000

- * List out various 8-Bit, 16-Bit, 32-Bit Motorola series Microprocessors.
- Compare MC-6800 with other Microprocessors 8085, Z-80 etc.
- List out various Registers available in MC-6800 and explain Register organisation.
- Describe various status flags of MC-6800.
- List out different modes of addressing in MC-6800.
- Explain Interrupts.
- List the additional features incorporated in MC-68000.

6. Microprocessor application

- * Explain the application of Microprocessors in various industrial and communication field.
- List out typical applications.

Handwritten signature

Handwritten scribble

28/28

6.1 Bus Connectors

* Enlist various bus connectors

* Demonstrate DB-25, CENT 36, RS-232C, RS-232C, IEEE 488, 9-pin TTL, DB-9, D4485.

- know the male-type and female type, pin and buss connectors.
- list out the use of various type of connectors.

6.2 7-segment LED Display (Comm.Elx.+Ind.Elx.)

* Draw circuit diagram for 7 segment LED display using 8255 interface chip for displaying '0' to '9'.

* Demonstrate the function of circuit.

- Write programme for the above circuit and execute.
- write functional table for 7-segment decoder/driver for decimal number '0' to '9'.

6.3 DC Motor speed and Direction controller (Ind.Elx.)

* Draw schematic circuit diagram for dc motor speed control and direction control using 8254.

- Describe the function of the circuit.
- Write programme for above circuit for 8085/2-80/8080/8086/8088 and execute it.

6.4 Stepper Motor Interfacing (Using 8255) (Ind.Elx.)

* Draw block diagram for interfacing of stepper motor.

- Draw schematic circuit diagram using 8255.

- Write the programme using any Microprocessor and execute it.
- Explain the circuit operation.
- Explain the principle and working of Stepper motor.

* Constructional detail of Stepper motor and working principle.

6.5 Traffic Controller Model (Using 8255) (Comm.Elx.+ Ind.Elx.)

* Draw the schematic diagram and port connections using 8255.

- Describe the sequence of operation.
- Write programme for the above mentioned sequence.

K. Singh

28/29

28/29

- 6.6 Store speech and play back through speaker (Using ADC 080X and DAC 08XX) (Comm.Elx.)
 - * Draw the block diagram and explain.
 - draw schematic circuit diagram
 - Prepare flow chart.
 - Write programme for above circuit, execute & Run.

- 6.7 Temperature measurement and control (Ind.Elx.)
 - * Enlist the various devices used for temperature measurement.
 - Draw the schematic diagram for temperature measurement using ADC 0804 and 8255.
 - Explain its operation.
 - Draw the program flow chart for this.
 - Write the program for this.

- 6.8 Frequency measurement (Comm.Elx.)
 - * Draw the circuit diagram of sine-wave to square wave converter.
 - Explain its working.
 - Draw the schematic diagram for interfacing of sine wave to square wave converter using 8255.
 - Draw the program flow chart for this.
 - Write the program for this flow-chart.

- 6.9 Numeric keyboard/Display Interfacing (Comm.Elx.)
 - * Draw Basic block diagram and explain.
 - Draw schematic circuit diagram for interfacing.
 - Draw flow chart and write Algorithm.
 - Write programme, execute and run it.
 - Draw key board Matrix circuitry.

Refer Anshuman Guide model Accessories.

- 6.10 Elevation Simulator (Lift control) (Ind.Elx.)
 - * Explain the operation and sequence of an Elevator (lift).
 - * Draw and explain the schematic diagram for this.
 - * Draw the program flow chart.
 - * Write the program and execute.

Anshuman Guide model: Accessories.

Handwritten signature/initials

Handwritten scribble

28/30

Suggested list of experiments :

1. Study various parts and incorporated ICs to 8086/8088 Microprocessor system.
2. Write a programme to multiply two 16-bit binary numbers to give a 32-bit result for 8086/8088 and execute.
3. Write a programme to store data in a memory segment 8086/8088 and execute.
4. Write a programme to define ~~keys~~ keys, display the keys and ~~the key~~ the key, "ends the programme" for 8086/8088 ~~and execute~~ (For Key Assignment).
5. Write a programme to transfer a group of data to memory location using PUSH and POP instructions and execute.
6. Write a programme to add 8-Digit BCD number in AX and BX to 8-Digit BCD number in CX and DX, result should be stored in CX and DX. Execute the programme.
7. Prepare Hardware interface for Numeric keyboard/Display for 8085/8086/8088, write a programme and execute.
8. Configure a Microprocessor for 7-segment LED Display, Write the programmes, prepare functional table for decimal number 0-9 and execute. (Comm.Elx. + Ind.Elx.)
9. Control the speed and direction of a dc motor using Microprocessor and 8254. (Ind.Elx.)
10. Using 8255; Interface a stepper motor using a Microprocessors. (Ind.Elx.)
11. Prepare a model of "Traffic Signalling System" using Microprocessor and 8255 (Comm.+Ind.Elx.)
12. Prepare a hardware interface for speech synthesising for Microprocessor to record and playback through a speaker using ADC 080X and DAC 080X. (Comm.Elx.)
13. Interface a Temp. Controller to Microprocessor using ADC 0804 and 8255 and display temp. (Ind.Elx.)
14. Measure a given frequency using Microprocessor interfacing with 8255 and verify the frequency. (Comm.Elx.)
15. Prepare a model of Elevator/Lift and control it using Microprocessor. (Ind.Elx.)
16. Study the internals hardware circuit of 80286/80386/80486 based Microprocessor with co-processor and without co-processor justify the use of Math co-processor.
17. Program a PLC for stepper motor controlling (if possible)
18. Write programmes for 6800/68000. (if possible)
19. Write programmes for I-80/Z-800/Z-8000 (if possible)

NOTE The above practicals are suggested by a group of developers of this curricula; However, this list can be changed and moderated according to the facilities and resources available with the laboratory.

X cm by 29/6/96



29/31

Suggested list of referances/books:

1. The Intel Microprocessor 8086/8088,80186,80286,80386 and 80486 Architecture, Programming and Interfacing.
- by Barry P. Bray (III Edition)
(Merrill, an imprint of Macmillan Publishing Company, New-York, U.S.A Publication)
2. Fundamentals of Microprocessor and Microcomputers.
By- B.Ram.
(Dhanpat Rai & Sons, 1682 Nai Sarak, New Delhi - 110 006 Publication)
3. Microprocessors and Interfacing Programming and Hardware.
By-Douglas V.Hall
(Tata McGraw Hill Publishing Co.Ltd.)
4. An Introduction to Microprocessors.
- By Aditya P.Mathur.
(Tata Mc Graw Hill Publishing Co.Ltd.)
5. PC-Based Instrumentation
- by Tooley
(B-H. Newnes Publication, OXFORD, U.K.)
6. Architecture
- by R.S.Ganekar
(Wiley Eastern Publication)
7. Reference Manuals (User's Guide) - ANEHUMAN
- PEGASUS V-85
- 86-88/U-86
- Accessories

2x copy ✓
29/16

① ———— ②

④ Taguchi Quality System cycle: off-line and on-line; and Quadratic (Taguchi) Quality/Loss function.

- State Taguchi Quality System Cycle.
- State Taguchi's loss function.

Japanese Quality Management Culture :-

- Kaizen strategy (continuous improvement)
- Quality Circle
- Ishikawa's Cause and Effect Diagram (Fishbone Diagram)

- Appreciates Japanese concepts about TQM.
- State Kaizen strategy.
- Explains the concept of Quality Circle.
- Explains the Ishikawa's Cause and effect diagram with suitable illustrations.

Logic Structures

- Definition
- Purpose
- Procedure
- Application area

- * Understands the concepts related with Logic Structures.
- Define the term.
- Explain the purpose and procedure of developing of Logic Structure by giving illustrations.

Handwritten signature



28/33

Final Year Diploma in Electronics Engineering (Y-Scheme)

Subject/Course : ANTENNA & MICROWAVE TECHNIQUES

Code : ECY-304

Rationale :

The course aim is to provide upto date knowledge and skill in microwave communication since it is prominent medium of communication at higher frequencies.

The course covers wave propagation techniques, antennas and microwave devices and sources.

The emphasis has been given on operation and control of above devices. So that the student may aquire the skill to operate and control the microwave setups. The basic concept of transmission lines has also been highlighted.

[Handwritten signature]
29/1/22

[Handwritten mark]

28/34

Final Year Diploma in Electronics Engineering (Y-Scheme)

Subject/Course : ANTENNA & MICROWAVE TECHNIQUES
Code : ECY-304

Scheme of Studies (Hrs. distribution) :

S.No.	Topic	Hrs. Distribution		
		Theory	Practical	Total
1.	Wave propagation	20	10	30
2.	Microwave devices and components.	25	14	39
3.	Microwave measurements	15	20	35
4.	Transmission lines & their characteristics	10	-	10
5.	Antenna fundamentals & their characteristics.	26	20	46
Total		96	64	160

Table of Specification for Assesment:

S.No.	Topic	K	A	C	T
1.	Wave propagation	10	6	4	20
2.	Microwave devices and components.	4	10	6	20
3.	Microwave measurements	-	12	8	20
4.	Transmission lines & their characteristics	6	4	-	10
5.	Antenna fundamentals & their characteristics.	5	9	16	30
Total		25	41	34	100

K-> Knowledge A-> Application C-> Comprehension

20/11/96

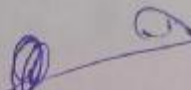
R. S. S. 29/10/96

29/35

Subject : ANTENNA & MICROWAVE TECHNIQUES.

Code : ECV - 304

S.No.	Topic/Sub topic	Intended Learning Outcome (ILO) (Objective)	Remark
1	Wave propagation	The student must know the range of propagation and effect of ionosphere on wave propagation.	
1.1	Ground wave surface wave, space-wave ionosphere, reflection and refraction of radio waves in ionosphere. Skip distance and multipath transmission. Optimum frequency.	<ul style="list-style-type: none"> - Describe the different layers in ionosphere. - Describe wave propagation in different mode of communication. 	
1.2	Guided waves and waveguides, concept, mode theory & its excitation, waveguide components.	<ul style="list-style-type: none"> - Explain guided waves - Explain how waveguides are superior to transmission line. - Describe various modes and its excitation methods in wave guides. - List wave guide components, its feature and uses. 	
2	Microwave Devices and components.	The student must know the microwave devices components and its uses.	Teachers are supposed to demonstrate the microwave component available for lab while teaching the concern topics.
2.1	Limitations of transistors at Microwave frequencies, Microwave transistors, parametric amplifier, tunnel diode, Gunn effect, Gunn diode oscillators Avalanche effect IMPATT & TRAPATT PIN diode and their applications. Stimulated emission of devices such MASERS & LASERS, T-junction, Magic Tee, Attenuators, Direction-couplers bends, Isolators & circulators.	<ul style="list-style-type: none"> - Discuss the limitation of transistors at microwaves. - What are the advantage of parametric amplifier and tunnel diode amplifier. Give their specific uses. - How the stimulated emission is achieved. Give the working principle of LASER. - Describe the working principle of GUNN diode. Compare it with klystron tube. - Name various microwave component and describe in brief. - Explain Isolators and circulators. 	<p><i>K. Srinivas</i> 29/6/98</p>



28/36

2.2 Generation of microwaves by tubes, limitation of conventional tubes, velocity modulation, klystron amplifier, Reflex klystron, Magnetron, Travelling Wave Tube (TWT), Backward wave oscillator (BWO), Their specification (e.g. power output, frequency etc.) uses and limitations. Power supply and their specifications.

- Describe different microwave sources and their specific uses.
- Explain principle of microwave sources and their uses in microwave communication.
- Compare different sources of microwave generation in respect of output power and frequency etc.

3 Microwave Measurement:

The students should know the measurement procedure of different parameters of Microwave link.

3.1 VSWR measurement, microwave power measurement, Frequency measurement measurement of Attenuation.

- Describe the different methods of VSWR measurement.
- Write the procedure for measurement of microwave power, Attenuation using microwave benches.

4 Transmission Line & their characteristics.

The students should know about different parameters of RF lines and co-axial cable.

4.1 Propagation constant, Attenuations constant, characteristic impedance concept of incident and reflected wave. Standing wave and VSWR. Short circuit and open circuit line. Half wave quarter wave, Eight wave line and their uses. Co-axial cable and their construction. Calculation of characteristic impedance of co-axial cable.

- What is impedance matching
- What do you understand by the line of resonant length.
- Give the constructional details of co-axial cable.
- What are the primary and secondary constant of Transmission lines.
- Define VSWR and reflection coefficient.
- Explain "Attenuation".

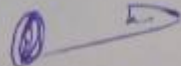
5 Antenna fundamental and their characteristics:

Understand the Characteristic of various antennas and their specifications, behaviour and uses at different frequencies.

Radiation pattern must be demonstrated in lab using Radiation pattern generator for different antennas.

- Write the function of an antenna.

Handwritten signature and date: 29/6/2016



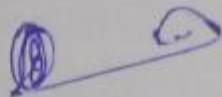
28/37

5.1 Radiation, Radiated field strength at a point, Radiation pattern, Elementary antenna, dipole antenna, Half wave antenna, Directive resistance, effective length of antenna, Beamwidth and Bandwidth of antenna. Distribution of voltage and current for half wave dipole. Antenna arrays, Broadside and end fire array Orientation and polarization of antenna.

- Define:
 - . Radiation resistance
 - . Antenna efficiency
 - . Beam width
 - . Power gain
 - . Directivity
- Draw V and I distribution pattern of half wave dipole.
- Differentiate between 'broad side' and 'end fire' array.
- Explain the polarization and orientation of an antenna.

5.2 Type of antenna, their uses. Broadcast, longwave, mediumwave & shortwave loop and helical antenna, Horn, Yagi-uda, Folded dipole and Rhombic Antenna. Parabola reflector antenna and log periodic antenna.

- List various types of antennas.
- What do you mean by resonant and non-resonant antennas.
- Describe and compare different types of antennas and give their specific uses.



Handwritten signature and date: 29/11/96

28/38

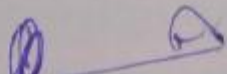
Final Year Diploma in Electronics Engineering (Y-Scheme)

Subject/Course : ANTENNA & MICROWAVE TECHNIQUES
Code : ECY-304

Practical List:

1. Study of Gunn Diode & Gunn Oscillator.
2. Study of Klystron & Reflex klystron tubes.
3. Study of Magnetron.
4. Study of Isolators, directional couplers (cross directional & multihole) slotted line & block diagram of basic microwave bench.
5. Study of VSWR meter.
6. Measurement of frequency of microwave.
7. Measurement of guide wavelength.
8. Measurement of Standing wave ratio (VSWR)
9. Measurement of reflection coefficient.
10. Measurement of cutoff wavelength (TE₁₀ mode)
Using $c = 2 / (m/a) + (n/b) = 2a$
11. Study of E-plane, H-plane and Magic Tee's.
12. Study of pin diode and pin modulator.
13. Measurement of guided power.
14. Measurement of attenuation in dB for a given component.
15. Study of waveguide Horn-Antenna.
16. Measurement of load impedance
17. Measurement of characteristics of klystron tube & Gunn Oscillator.
18. Measurement of radiation & diffraction through Horn-antenna's.
19. Assembling the microwave bench.
20. Study of UHF & VHF Transmitters.
21. Study of radiation pattern for different antenna's.
22. Measurement of characteristic for different antenna's.

K. Chakraborty
29/11



28/39

List of reference books :

1. Microwave Principle
by: Herbert J. Reich - C.B.S. Delhi
2. Antennas - by: John D.K. Kraus - T.M.H New Delhi
3. Electromagnetic theory, Components & Devices
by: Seeger J.A.
4. Electromagnetic theory - Franklin D.R.
5. Electromagnetic waves & Radiating System Ed2
by: Jordan B.C & Balmain K.B.
6. Theory & Electromagnetic waves - A coordinate free approach
by: Chan R.C.
7. Microwave devices & circuits Ed.2 by LIAD S.Y.
8. Electromagnetic wave theory - By: WALT J.R.
9. Microwaves - by: Gupta K.C.
10. Elements of Microwave Engg. - Chatterjee R.

K. Chatterjee
29/10/86



COMMUNICATION ELECTRONICS

28/40

SIXTH SEMESTER

* ECY305 ADVANCED COMMUNICATION

* ECY306 P.C. OPERATION

* ECY307 I.O.M. (ENVIRONMENT PROJECT)

* ECY308 AUDIO & RADIO ENGINEERING

* ECY309 PROJECT WORKSHOP (ENTREPRENEURSHIP)

[Handwritten signature]

28/41

Curriculum plan for 16 weeks.
Total Hours per week : 36
Total Hours: 576 Hrs.

M.P. BOARD OF TECHNICAL EDUCATION, BHOPAL
FINAL YEAR DIPLOMA PROGRAMME IN COMMUNICATION ELECTRONICS (Y-SCHEME)
SIXTH SEMESTER
(To be introduced in 1996-97 at PDU beneficiary Polytechnics)

S.No.	NAME OF SUBJECT	SCHEME OF STUDY			SCHEME OF EXAMINATION									
		CONTACT HRS. PER WEEK (SEMESTER)			SESS. MKS. PROB. ASSESSM.				BOARD EXAMINATION					
		THEORY	LAB.	TOTAL	TERM (WORK)	LAB. (WORK)	I	II	THEORY PAPER	DURATION	MKS.	PRAC. TICAL	DURATION	MKS.
ECV305	ADVANCED COMMUNICATION	4(64)	3(48)	7(112)	20	35	10	10	1	3 Hrs	100	1	3 Hrs	50
ECV306	P.C. OPERATION *	4(64)	4(64)	8(128)	20	35	10	10	1	3 Hrs	100	1	3 Hrs	50
ECV307	I.O.M. (ENVIRONMENT PROJECT) *	5(80)	2(32)	7(112)	20	-	10	10	1	3 Hrs	100	-	3 Hrs	50
ECV308	AUDIO & RADIO ENGG.	4(64)	4(64)	8(128)	20	35	10	10	1	3 Hrs	100	1	3 Hrs	50
ECV309	PROJECT WORK	-(-)	6(96)	6(96)	-	35	-	-	-	-	-	1	4 Hrs	100
TOTAL		17(272)	17(304)	36(576)	80	140	40	40	4	-	400	4	-	300

* Common for Communication Elx and Industrial Elx.

- NOTE: (1) No. of theory paper : 3 (7) Ratio of theory marks : 400/600 (9) Total Marks : 1000
 (2) Total theory marks : 400 and (Sessional+Prog. Assess., +Practical+Inplant Training marks. (10) Passing marks for:
 (3) No. of practicals : 4 (a) Theory - 55%
 (4) Total Pract. Marks : 300 (b) Practicals - 40%
 (5) Inplant Training Mks.: - (c) Sessionals - 50%
 (6) Total Mks. of sessional : 300 Prog. Assessment, Pract. & Inplant Training. (d) Inplant Training - 50%

K C Mahajan
29.6.96
K C Mahajan
PDU Bhopal

(Signature)

(Signature)
29/6/96

28/42

Final Year Diploma in Electronics Engineering (Y-Scheme)

Subject/Course : ADVANCED COMMUNICATION
(Optional with Power Supply)

Code : ECY-305

Rationale:

The broad band and data communication became advanced with the use of computers and data processing and continue to develop into a major industry providing the interconnection and transmission services between distant sites.

The course aim is to provide knowledge about advancement in concept, equipment and process of communication at various frequencies.

The subject deals with new way of data transmission i.e. through optical fibre. In addition, it covers advanced data networks, satellite communication and RADAR.

The course will be useful to update the knowledge of students about new advancement in communication.

Handwritten signature

Handwritten signature

28/43

Final Year Diploma in Electronics Engineering (Y-Scheme)

Subject/Course : ADVANCED COMMUNICATION
(Optional with Power Supply)
Code : ECY-305

Scheme of study (Hrs. distribution) :

S.No.	Topic	Hrs. distribution		
		Theory	Practical	Total
1.	Optical fibre communication	20	20	40
2.	Data communication	18	20	38
3.	Local Area Network	10	10	20
4.	Radar	6	4	10
5.	Satellite Communication	10	10	20
Total		64	64	128

Table of specifications :

S.No.	Topic	K	C	A	T
1.	Optical fibre communication	10	10	10	30
2.	Data communication	5	10	15	30
3.	Local Area Network	5	5	5	15
4.	Radar	-	3	5	10
5.	Satellite Communication	5	5	5	15
		25	33	40	100

K -> Knowledge C -> Comprehension A -> Application T -> Total

Handwritten signature

23/44

Subject : ADVANCED COMMUNICATION.

Code : ECY-301

S.No.	Topic/Sub topic	Intended Learning Outcome (ILO) (Objective)	Remark
1.	Optical fibre communication	Understand the principles of optical fibre communication system, its characteristics and the applications.	Student should be exposed to various fibre links and its associated measurements.
1.1	Fundamentals of fibre optics <ul style="list-style-type: none"> . Fibre optic cables and its characteristics . Types of fibres . Fibre parameters. . Propagation modes 	<ul style="list-style-type: none"> - Draw the basic block diagram and explain the function of each block. - Classify the fibres - Define various parameters of fibre like dispersion, refractive index, Numerical aperture & acceptance angle. - Describe various propagation modes of fibre. 	<ul style="list-style-type: none"> - Show the tools used in optical link assembling and its handling/ specifications.
1.2	Optical transmitter and receiver <ul style="list-style-type: none"> . Transmitter and receiver characteristics . Block diagram . Modulation and demodulation techniques. . LED, s and detectors . Line coding and decoding . Analog bandwidth . PC to PC communication . Specification criteria in selection of transmitter and receiver. . Power meter used in optical fibre link. . Special tools and its uses in fibre joining/splicing and cutting. 	<ul style="list-style-type: none"> - Draw the basic block diagram of transmitter. Write the function of each block. - List modulation techniques used in fibre communication. - Describe above in brief. - Explain line coding and decoding - Explain analog bandwidth. Write its significance. - List the selection criteria of fibre transmitter and receiver - Describe the working and use of power meter in optical link. - Name special tools used to assemble fibre link. - Name special tools used to assemble fibre link. - List the advantages of optical fibre over co-axial cable. 	

X work

(Signature)

28/45

- 2 Data communication
 - 2.1 Introduction
 - Understand the concept of data communication, its modes of operation and its applications.
 - List various modes of data transmission
 - 2.2 Transmission mode
 - . Simplex
 - . Half duplex
 - . Full duplex
 - Explain the working of
 - . Simplex
 - . Half duplex
 - . Full duplex
 - 2.3 Data communication codes
 - . Baudot code
 - . ASCII code
 - . Code error correction/
 - . Synchronisation
 - Write the features of Baudot and ASCII codes.
 - Explain the code correction techniques
 - Write the importance of synchronisation in coding.
 - 2.4 Data communication hardware
 - . LCU
 - . DCE
 - . DTE
 - . UART
 - . USART
 - Write the features and use of following hardware:
 - . LCU
 - . DCE
 - . DTE
 - . UART
 - . USART
 - 2.5 Data communication interfaces
 - RS 232C
 - RS 449A
 - Data modems
 - Explain the basic characteristics and uses of following interfaces
 - RS 232C
 - RS 449A
 - Data modems

Local Area Network

Understand the principle, types, characteristics and uses of LAN in data communication.

- Introduction of LAN
 - Component of LAN
 - LAN servers
 - LAN workstation
 - LAN operation mode
 - LAN cabling
 - Network operating system
- Explain the concept of LAN
 - State basic components of LAN
 - Explain various operation modes of LAN.
 - State the function of LAN server
 - Explain LAN operating system.

K. S. K.

(Signature)

28/46

- LAN types
- Modems
- Routers/Hubs
- Topology of networking
- Knowledge of LAN softwares

- State the types of LAN and its relative features.
- Describe various routers/hubs used in LAN.
- Explain topology of networking
- List basic softwares used in LAN and its features.

4 **Radar:** Understand the principle characteristic and use of RADAR.

- 4.1 Basic principle
- 4.2 Basic block diagram
- 4.3 General terms
- 4.4 Range equation
- 4.5 Effects of noise
- 4.6 Types of radar pulsed and CW
- 4.7 Pulse radar, beacon, MTI, doppler effect, FMCW, blind speed
- 4.8 Methods of scanning
- 4.9 Display methods.

- Explain the principle of RADAR
- Draw the block diagram & name the blocks of a radar system.
- Define PRF, range, scanning speed etc.
- Derive radar equation and discuss practical aspects.
- Explain the effect of noise on radar range.
- State the types of Radar
- Explain basic operation of pulse and CW radar with the help the block diagram and write its uses.
- State advantages and disadvantages of above types.
- Draw and explain basic MTI.
- Explain the methods of scanning
- List the display methods used

5 **Satellite communication** Understand principle, types and uses of satellite communication

Information about PSLV, GSLV, INTEL SAT etc.

- 5.1 Low - orbit regional satellites
- 5.2 Geostationary satellites

- State basic system, antenna, power, range, tracking, controlling, uses.
- Explain launching, setting in orbit, tracking, receiver, master, station, earth station, repeaters, links, services.
- Constructional details of satellite.

K. Srinivas



28/47

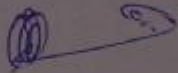
- 3.3 Disk operation
- 3.4 Advance systems

- State & explain conversion and reception of TV channels.
- Explain with block diagram data communication networking, videotext, videophone, ISD, paging, cellular phones etc.

Practical demonstration.

- Write the applications of each of the above

K. V. S. L.
29/6/96



28/48


Final Year Diploma in Electronics Engineering (Y-Scheme)

Subject/Course : ADVANCED COMMUNICATION
(Optional with Power Supply)
Code : ECY-305

List of Practicals:

1. Study of optical fibre parameters.
2. Study of optical fibre as transmission media
(a) TDM with 16 channels
(b) measurement of Numerical aperture
(c) Framing in TDM
(d) manchester coding and frequency response of a CODEC
3. Study of losses in optical fibre
(a) measurement of bending loss
(b) measurement of propagation loss.
4. Study of characteristics of fibre optic LED and photo detector.
5. Study of PAM/PPM/PWM signals.
6. Forming simple fibre optic analog link
7. Study of PC - to - PC communication using optical fibre link and two RS 232 cards.
8. Study of videotext, video phone and ISD .
9. Study of cellular phone and paging system .
10. Study of various LAN networking

X
29/10/96



28/49

List of books:

1. Advance Electronic Communication Systems
by: Wayne Tomasi - Prentice Hall International Edition
2. Principles of Communication Systems
by: Taub and Schilling - McGraw Hill International Edition
3. Communication Systems: An Introduction to Signal and Noise
Electrical Communication.
by: A. Bruce Carlson - McGraw Hill International
4. Fibre Optics Communication and Other Applications
by: Henry Zanger & Cynthia Zanger
Maxwell Macmillan International Edition
5. Modern Digital Analog and Communication Systems
by: B.P. Lathi - Prism Book Pvt. Ltd.
6. Introduction to Digital Communication Switching
by: John Ransay - Wheeler Publications
7. Communication Systems: An Introduction to Signals and Noise
Electrical Communication
by: A. Bruce Carlson - McGraw Hill International Edition

A. Carlson 

28/50

Final Year Diploma in Electronics Engineering (Y-Scheme)
(COMMON FOR COMMUNICATION AND INDUSTRIAL ELECTRONICS)

Subject/Course : PC-OPERATION
Code : ECY/IEY-306

Rationale :

As Computer is big-boom of the modern era, and very much in everyday activities on every level. It has its own importance in Office Management Systems, Industrial Production System as well as in Home applications. Therefore it is very essential that every individual must be a Computer literate and able to operate computer for his own needfulness.

Since the electronics is very much involved with manufacturing as well as software development of Computers, the society expects that the Electronics Diploma Holders must have adequate knowledge and skills in Computer-Hardware as and Software. Keeping this matter of fact in mind, a subject in the Electronics Engg. Courseware of 'Y-Scheme', for the computer awareness "PC-OPERATION" is being introduced for the students of the Electronics stream to fulfil the expectation of the society and the industries.

In this courseware it has been taken care of that the students must be having a good knowledge of the internals of the computers, its specifications, peripherals, compatibility and the Application Softwares in use.

[Handwritten signature]

28/51

Final Year Diploma in Electronics Engineering (Y-Scheme)
(Common for Electronics Communication and Industrial Electronics)

Subject/Course : PC-OPERATION
Code : ECY/IEY-306

Scheme of Studies :

S.No.	Chapter/Topic	Theory	Practical	Total
1	Introduction to micro-computer/pc	06	04	10
2	Internal organization of microcomputer	08	04	12
3	Input, output and peripheral devices	15	06	21
4	Operating system	10	20	30
5	Database & application software	29	30	59
Total		64	64	128

Table of specification for assessment :

S.No.	Topic / Chapter	K	C	A	Total
1.	Introduction to microcomputer / pc	05	-	-	05
2.	Internal organization of micro-computer	05	12	03	20
3.	Input, output and peripheral devices	05	10	05	20
4.	Operating systems	06	10	06	22
5.	Database & application software	08	10	15	33
Total		29	42	29	100

Note : K --> Knowledge Level.
C --> Comprehension Level.
A --> Application Level.

Handwritten signature and date:
29/6/96
29/6/96

28/52

Subject : P.C. Operation

Code: IEY-306

S.No.	Topic/Sub Topic	Intended Learning Outcome (ILO) (Objective)	Remark
1	<u>Introduction to microcomputer and PC.</u>	Students WILL be able to understand the functioning concept of Microcomputer/PC.	
1.1	The evaluation of Micro-computers.	* Give the historical background in the development of Microcomputers.	
1.2	Block Diagram	* Draw block diagram of a Microcomputer/PC. - Explain functionality of each block.	
1.3	Generation and Classification	* Describe the generation of Computers. - Describe the classification of Micro-computers.	
1.4	Data Information	* Define data and information. - Distinguish the difference between data and informations.	
1.5	Software & Hardware	* State the concept of software and Hardware. - Define the Microcomputer Hardware. - Enumerate the various Hardware parts of a Microcomputer. - Define the Computer software and give examples.	
1.6	Types of Software	* Explain various types of softwares. - List out the various software for each type.	* Application, Utility and system software.
1.7	Virus and Vaccines	* Define the virus in computers - List out various types of viruses and its effects. - List out various vaccines available. - Explain the concept of diagnostic software and its utility with examples.	* Demonstrate virus effect on a computer/ File. - Remove virus and again show Computer/ File after cleaning. - Cleaning procedures. - Booting computer (infected) and its precautionary.

Handwritten signature

28/53

- 1.8 Generation of Languages/Packages
 - * Define Computer Language
 - Draw computer language/package hierarchy.
 - Define Low-level language
 - Distinguish among Assembler, Compiler and Interpreter.
 - clearly distinguish High-level language from Low level language.

- * Demonstrate some examples of languages and software (Packages)

- 1.9 IBM-PC Compatibility
 - * Describe the basic features of a IBM-PC.
 - Enlist various advantageous features of IBM-PC.
 - List out basic criteria for IBM-PC compatibility (i.e. IBM-Intel processors, DOS operating systems)

- * Demonstrate PC with Processors of AMD, Cyrix, Texas Processors (80286, 386, 486, instead of 1286, 386, 486) (If possible)

2 International organization of microcomputer.

- 2.1 Microcomputer/PC Board lay-out.
 - * Draw PC-System board lay-out.
 - Explain each block and its functionality.

- * Demonstrate the mother board of PC/PC-XT/PC-AT of different manufacturer.

- 2.2.0 PC Memory
 - * Describe various types of PC-Memory present with PC/Microcomputers.

- * RAM/ROM/HDD cache (internal/external) etc.

- 2.2.1 - Conventional RAM
 - * Explain various types of RAM used in PC/ Microcomputers.

- Demonstrate how RAM of a system is extended on motherboard.

- 2.2.2 - Upper Memory Area (UMB)
 - Distinguish the conventional RAM ,

- 2.2.3 - Extended RAM (XMS)
 - Extended RAM, Expanded RAM, Upper

- 2.2.4 - Expanded RAM (EMS)
 - Memory block (UMB), Video RAM.

- 2.2.5 - VRAM (Video RAM)
 - Explain utilities of XMS and EMS.

- 2.2.6 - BIOS ROM
 - * Explain BIOS-ROM and its utility in PC/ Microcomputer.

- Show the cache of a system on Mother board

ZC/ML



28/54

2.2.7 - Cache

- Explain cache, its utility and advantage.
- Distinguish between Internal Cache and External cache.

2.2.8 PC-Memory Allocation

- * Draw PC Memory allocation table, showing the different areas of Memory Allocation i.e. BIOS Area, User Memory Area, Video memory area, Command com area etc.
- * Draw Memory table and show location of each area.

2.3 Maths Co-processor.

- * Explain the function of Maths Co-processor and its utility.
- Enumerate the various co-processors available for various Micro-computer/ PC-systems.
- + Demonstrate, the Math Co-processor on board. And also demonstrate how to put it in its slot.

2.5 Bus Architecture Technology

- * Explain various types of Bus Architecture technology used in Micro-computer/ PC i.e. ISA, EISA, PCI and VL-Bus.
- Enumerate the advantage of various Bus architecture systems.
- * Show/ demonstrate various architecture Bus in the computer and its features (if possible)

2.4.0 PC-Expansion systems

- * Describe the standard expansion bus system within the PC/Microcomputer.
- Explain the means of connecting essential peripheral hardware through controller cards in a PC/Micro-computer.

2.4.1 PC-Expansion Bus.

- Explain primary and secondary expansion bus.
- * Show/demonstrate the 62-way and 36-way

2.4.2 PC-Expansion Cards

- List out various expansion card format i.e. short card, Half size card, standard 8-bit card, 16 bit cards etc.
- Expansion-Bus, various types of Expansion cards, or plug in cards.

2.4.3 PC-Expansion Bus connector

- Explain the direct edge type expansion bus connector (62-way and 36-way).
- Explain power rail connectors and show on computer.

K. Srinivas

(Signature)

28/55

2.6 Communication Ports

- * Describe communication ports available in PC/Microcomputers and its utility.
- Enlist various communication ports and functions i.e. serial ports, Parallel ports, IPT.
- List common serial/parallel interface connector (i.e. RS-232/RS-232-C etc.)
- Explain communication between PCs through serial ports using VTERM/XTALK.
- * Identify the ports and its connectors 9-pin D-connector, 25-pin connector, Edge-type connector etc. and demonstrate.

3.7 PC/Microcomputer specification

- * Write typical specification of PC/Microcomputer and interpret each specification term.
- Select best suited PC/Microcomputer for specific use.
- * Demonstrate a typical system specification verification.

3 I/O and Peripheral devices

- * Explain the need of other I/O and peripheral device to run a micro-computer/PC.
- Enlist various bare-minimum I/O and peripheral devices i.e. Monitor, Key board etc.
- Demonstrate various type of I/O and peripheral device on a PC. (if possible)

3.1.0 Video Display Unit (Monitor)

- * Enlist various Video mode (Graphics) related to computers.
- Select video display for specific computer.
- * Show various type of Graphic adapter cards and Monitor (Monochrome and colour) and its graphic capabilities. (if possible)

3.1.1 Video Display Adaptors

- CEA
- MCGA
- EGA
- HGA
- VGA
- SVGA

- Enlist the advantages of color monitor over Monochrome monitor.
- * List out various graphics adapter mode of video used for PC/Micro-computer.
- * List out the features of various Graphic Adapter.

3.2.0 Input devices

- * Define Input device and its necessity for a computer.
- List out various input device, most commonly being used. i.e. Keyboard, Mouse, Track-Ball, Joy-stick, Light-pen, Digitizer, Scanner etc.
- * Demonstrate various input devices available and its use as input device.

K. Singh

28/56

3.2.1 Key board

- * Define function of a key board
- enlist various types of key board commercially available. (i.e. 83-key, 101-key, Enhanced 101-key, Ergonomic key board ect.)
- List out various types of keys available on a keyboard and explain each.
- Explain the difference between Type-writer keyboard and computer keyboard

- * Demonstrate 83-key, 101-key, Enhanced 101-key, Ergonomic key-board.

3.2.2 Mouse/Trackball

- * Define function of a Mouse/Track ball
- Explain the installation of a Mouse/Track-ball.
- List out features of a Mouse.
- Compare Mouse with Track-ball with its features.

- * Demonstrate Mouse/Track-ball and its functioning.
- Demonstrate, how to install, loading its drives.

3.2.3 Other Input devices

- * Enlist various input devices apart from key-board and Mouse.
- Enlist various features of all other input devices abd specific uses.

- * Demonstrate all other input devices, i.e. scanner, Digitizer, Joy-stick, Template, Light pen etc. (as per availability)

3.3.0 Output Devices

- * Define the function of output device and its necessity.
- Enlist various output devices commonly used.
- Explain the various specific application for each devices.

- * Demonstrate various printers Plotters and its function.

3.3.1 Printers

- * Enlist various types of printers. (i.e. DMP, Line-Printer, Inkjet, Bubble-Jet laser)
- Define Impact and Non impact Printers
- Explain various features of each category printers.
- List out the various application.

- * Demonstrate output of each printer and show for comparison.

3.3.2 Plotters

- * Define Plotter and its necessity for specific use.
- List out various type of Plotters
- explain the features of plotters.

- * Demonstrate the operation of a plotter and compares its output with printer output.

28/57

3.4.0 Peripheral devices

- * Define the peripheral devices and its utility.
- Enlist various peripheral devices commonly used.

- * Demonstrate various peripheral devices and its utility.

3.4.1 Storage Devices

- * Explain the need of storage device for a computer.
- List out various storage devices and explain (i.e. Floppy Disk, Hard Disk, CD-ROM Disk, Tape etc.)
- Distinguish the difference between Hard-Disk and Floppy Disk.
- Explain the concept of serial and Direct Accessing of data/information.

- * Show the various storage devices and demonstrate how to connect with the system.
- Show the FDD of 5.25" and 3.5" and its Floppies and use.
- Demonstrate storage in FD and HD.
- Show CD-ROM Disk and reading from it (if available)

4. Operating systems

- * Define the operating system and its necessity for a PC/Microcomputer.

- * Demonstrate various operating system on line (if possible).

4.1 Concept of operating systems

- * Explain the concept of operating system in a Microcomputer.
- Justify the necessity of OS.

4.2.0 Various operating systems

- * List out various operating systems commonly in use. (i.e. DOS, OS/2, UNIX, WINDOW-95 etc.)
- Enlist various advantageous features of each operating systems.
- Explain single-user/Multi-user concept in operating systems.
- List out advantages of single user as well Multi-user systems.
- Define the concept of user-Friendly environment for a computer.

- Demonstrate single user/Multi-user environment (if possible)

4.2.1 Disk operating system (DOS)

- * Enlist various types of command in DOS (i.e. Internal, External, Interrupt commands)
- Explain the concept of FILE and DIRECTORY.

- * Demonstrate the installation of MSDOS system on computer and configures it.

K. Singh

[Signature]

4.2.2 Boot-up Sequence

- List out various File extension and explain. (i.e. EXEC-Files, COM-Files, SYS-Files, BATCH Files etc.)
- Installation of MS-DOS.
- List out various Internal COMMANDS and Explain each with syntax. (i.e. FORMAT, BACKUP, XCOPY, RECOVER etc.)
- Define Interrupt COMMANDS and Explain (i.e. "C,"F etc.)
- * Explain Boot-up sequence.
- Modify CONFIG.SYS and AUTOEXEC.BAT Files as per application and working environment. (or create it)
- Configure PC/Microcomputer with Extended, Expanded and Upper memory area. (i.e. High Memory area loading)

- Operate various COMMANDS.
- Show various Files with different extension using DIR, COMMANDS.

- * Create new config.sys and Autoexec.Bat File and run the systems and show its effect. Demonstrate the method of Using Hmem Sys and Upper Memory area configurations. (use of MEMM Aker)

4.3.0 Networking

- * Explain the concept of Networking and its utility and environment.
- List out various networking systems (i.e. LAN, MAN, WAN and Ethernet, Token-Ring, Peer to Peer, Remote or Satellite networking etc.)
- List out various networking software available.

- * Explain various Networking systems and give brief introduction to each including Thick/Thin Ethernet.

5. Database & application software.

5.1.0 Wordprocessing (Documentation software)

- * Explain database concept and various application software and utility.
- * Explain the concept of wordprocessing or documentation software.
- List out various documentation S/W available (i.e. WORDSTAR, WORD-PERFECT, MS-WORD, LOTUS-WORD etc.)
- Enlist various features of WORDSTAR/WORD-PERFECT.

- * Demonstrate the installation of WSTAR or WORDPERFECT and configuration.
- Use of Internal Macros and Hot-keys.
- Show Printer configuration and Printing

Handwritten signature

Handwritten mark

28/59

- Enlist various Hot-keys and Macros of above software and explain.
 - Install above S/W and configure according to system configuration.
 - Use above S/W.
 - Print documents.
- 5.2.1 Database
- * Explain database system and its needfulness.
 - List out various types of database and its practical use.
- 5.2.2 Database Software
- * List out various database softwares available. (i.e. dBASE, FOXBASE, LOTUS etc.)
 - Describe various functionality of database Software or Packages.
 - Explain various features of above Packages.
 - * Demonstrate the use of dBASE/FOXBASE using Menu.
 - Demonstrate the writing of simple program and run it.
 - Print labels, Report etc.
- 5.2.3 dBase/Foxbase
- * Enlist various command syntax of dBASE/FOX-BASE and Hot keys.
 - Explain the use of these commands.
 - Write simple programme in dBASE/FOXBASE and run it.
 - Print out report on dBASE/FOXBASE.
- 5.2.4 Lotus
- * Enlist various command and Hot-keys for LOTUS and explain.
 - Prepare database in LOTUS and Print-out reports and graphs.
 - * Demonstrate installation of LOTUS and configuration of systems.
 - Demonstrate the printing and Group printing using LOTUS.
- 5.2.5 DBMS and RDBMS
- * Explain the concept of RDBMS.
 - Distinguish the advantages of RDBMS over DBMS.
 - Enlist various RDBMS Packages. (i.e. ORACLE, INGRES, INFORMIX, SYBASE etc.)
 - * Demonstrate RDBMS S/W on any practical site or demo. (if possible)

K. C. Singh

28/60

3.3 Technical Utility Softwares

- * Explain the need of Technical Utility S/W.
- List various technical utility S/W and uses (i.e.Circuit Maker,Electronic Bench,Cad-Star,AutoCAD etc.)
- Install Technical software onto the system and configure it.
- Use the Software and get output on Printer/Plotter etc.

- * Demonstrate the various S/W on the system and show the use. (i.e.Circuit Maker/EMB/Cad-Star/Auto-CAD etc)
- Show the installation of any of the above software and run it.

3.4 Antivirus Software

- * Explain the needfulness of Antivirus Software.
- Enlist the various Antivirus S/W commonly used and popularly used. (i.e.Dr.Solomon,NAV,Nashot,CPAV,IAVT, Red Alert etc.)
- Use the scanner for detection of viruses in the system and clean it.
- Use inbuilt virus scanner/clean in MS-DOS 5.0 or higher version.

- * Show the scanning process for viruses in the system and cleaning using various Antivirus tools/Softwares.
- * Use MSRV.

3.5 WINDOWS

- * Concept of WINDOWS environment.
- List out various advantageous features of WINDOWS environment.
- Work in WINDOWS environments and close applications.

- * Demonstrate WINDOWS installation and use.
- Switching from WINDOWS to DOS or vice-versa.

3.6 D.T.P. ~~MULTIMEDIA~~

- * Explain D.T.P., ~~Multimedia~~ and their uses in brief.
- Explain latest development in DTP and Multimedia Environment.
- Enlist various S/W for DTP and Multimedia.

- * Show the demo on DTP and Multimedia Presentation.
- Give idea of writing, page maker coral draw for DTP.
- Give idea about sound blastics & presentation graphics software.

[Handwritten signature]

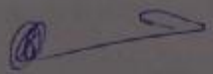
[Handwritten flourish]

28/61

Suggested list of experiments :

1. Study Various Input, Output & Storage Devices.
2. Study the cables and connections of various I/O Devices and Peripheral Devices .
3. Study the functioning of Keyboard / Mouse, Monitor, Printer.
4. Study the internal parts/devices and its interconnections from or to Motherboard.
5. Practice COMMANDS of DOS :-
(a) Internal Commands. (b) External Commands. (c) Interrupt Command.
6. Practice for ROM-BIOS SET-UP of the computer.
7. Practice to Create & Modify CONFIG.SYS and AUTOEXEC.BAT Files and its effect on Booting-up.
8. Practice for Upper memory Area configuration and HIMEM.SYS Configuration of a computer, Find out the change in internal RAM allocation available for user (using MEM).
9. Connect two PCs through Serial Ports using VTERM and Xtalk etc.
10. Study various type of VIRUSES and its effect on computer, its Scanning with the Scanner-Software and removing viruses using VACCINES.
11. Practice on File & Directory Maintenance on HD / FD, Defragmentation using DEFRAG and File / Disk-Repairing using CHKDSK, SCANDISK.
12. Practice on WordStar / WordPerfect :-
(a) Creation of a File. (b) Editing a File.
(c) Printing a File. (d) Merging.
(e) Dot Commands & Internal Macros. (f) Configuration WordStar, Printer etc.
13. Practice various COMMANDS of File-Management Programming.
14. Practice on dBase-III / IV / V or FoxBase :-
(a) Create Database. (b) Import / Export Database.
(c) Label Printing. (d) Database Printing with Arguments.
(e) Report Writing/Printing. (f) Dot COMMANDS.
(g) Simple Programming and Execution.
15. Practice on LOTUS 1-2-3 :-
(a) Prepare Spreadsheet. (b) Printing.
(c) Configuration for Spreadsheet. (d) Configuration for LOTUS-Graph.
(e) Printing Graph.
16. Practice on WINDOWS Environment, and Configuration of WINDOWS.
17. Prepare different types of Electronics Circuits using CadStar / EWB / AutoSketch / Circuit Maker or any other.
18. Prepare PCB Lay-out / Drafting using CircuitMaker / CadStar / Autosketch or any other.
19. Study any D.T.P. Software and use it.
20. Study any Multimedia / Animation Software and use it.
21. Study various types of common operation fault diagnosis.

K. Srinivas



28/62

Suggested list of References/Books :

1. "PC Based Instrumentation and Control"
-by Mike Tooley
NEWNES imprint, Butterworth-Heinemann Ltd.
Linacre House, Jordan Hills,
OXFORD OX2-8DP
2. "DOS 6.0 & 6.2 Companion"
-by Satish Jain
BPP Publications, New-Delhi
3. "Wordstar Professional"
-by R.K.Taxali
4. "Fundamentals of Computers"
-by V.Rajaraman
5. "Computer System Architecture"
-by Morris Mano
6. "LOTUS 1-2-3"
-by Myeller
7. "ABC's Of Windows 3.1"
BPP Publications, New-Delhi.
8. "Understanding dBase-III Plus"
-by Simpson
9. Reference Manuals of :-
a) CircuitMaker
b) Electronics Work Bench
c) CadStar
d) AutoSketch
e) PCBCad
10. Dummy Series From BPP Publications, New-Delhi.
11. "Introduction to Computer & MS-DOS"
-by Rjit Singh
12. SAMS IBM PC Trouble shooting & Repair Guide.
- by R.C. Brennan, BPP Publication.

K. G. Singh

(Signature)

28/63

Final Year Diploma in Electronics Engineering (Y-Scheme)
(Common for Electronics Communication and Industrial Electronics)

Subject/Course : INDUSTRIAL ORGANISATION AND MANAGEMENT (I.O.M.)
Code : ECY/IEY - 307

Rationale

The optimum operation of any industrial organization demands its staff to share the administrative and technical responsibilities efficiently and effectively. The great technological and sociological advances that have occurred in all segments of our society have forced the developments of new management concepts, techniques and tools to cope up with complexity of growth and change. To meet the challenges of complexity, the systematic and organized approach in every discipline is indispensable in a society which is producing more technically qualified persons, newer materials and complex products and more information than ever before.

Keeping in view of the competencies identified during discussions with a group of industrialists and academicians the following new topics have been added, apart from the conventional topics normally taught in management such as Management of Human resource, Production, Materials, value Engineering etc. New areas incorporated are Productivity, Total Quality Management (various approaches Philip Crosby, Deming, Juran, Taguchi, Kaizen etc.), Just-in-time concepts, Ishikawa diagram, SWOT analysis, Logic structures and Communication Skills etc.

Apart from this keeping in view of the importance and necessity, the basic concepts of work study, Maintenance and safety have been included. Due thought has been given to keep in line with the national emphasis on environment and pollution control.

[Handwritten signature]

[Handwritten mark]

28/64

Final Year Diploma in Electronics Engineering (Y-Scheme)
(Common for Electronics Communication and Industrial Electronics)

Subject/Course : INDUSTRIAL ORGANISATION AND MANAGEMENT (I.O.M.)
Code : ECY/IEY - 307

Scheme of studies (Time allocation)

S.No.	TOPICS	HRS.		Total
		THEORY	LAB./TUTORIALS	
1.	Management an overview	0	2	10
2.	Organization & Organizational Climate	8	2	10
3.	Human Factors in Production	10	2	12
4.	Materials Management	12	4	16
5.	Production Planning & Control	10	4	14
6.	Project Planning by Network Analysis	8	4	12
7.	Work Study	10	10	20
8.	Maintenance Industrial & safety pollution control.	4	4	10
9.	Application of Computers in Management.	4	-	04
10.	New trends in Management	4	-	04
		60	32	112

Table of specific for assessment :

S.No.	Topics	K	C	A	T
1.	-	04	02	-	6
2.	-	04	02	-	6
3.	-	06	03	02	11
4.	-	08	02	04	14
5.	-	08	03	13	14
6.	-	04	02	-	06
7.	-	06	04	04	14
8.	-	06	04	06	16
9.	-	05	02	-	07
10.	-	06	-	-	06
Total		57	24	19	100

K -> Knowledge, C -> Comprehension, A -> Application.

[Signature]

[Signature]

[Signature]

28/65

Subject: Industrial Organisation & Management.

Code : EGY/IEY-307

S.No.	Topic/Sub Topic	Intended Learning Outcome (ILO) (Objective)	Remark
1.	MANAGEMENT AN OVERVIEW:	Student will be able to:	
1.1	What is Management ?	- Knows about Management. - Defines Management.	
1.2	Brief history of Management	- Knows the history of Management.	
1.3	Function of Management - Planning - Organizing - Staffing - Directing - Co-ordinating - Controlling - Reporting - Innovating - Budgeting - Evaluation	+ Understands the concepts of Management. - Explains the functions of Management.	
1.3.1	Management Phases - Preplanning, Planning, Implementation and control.	- Explains the different phases of management. - Explains that the planning is a continuous process.	
1.4	Applications of management.	+ Understand the universality of the concept of application of management in different areas. - Outline the area of application of Management concepts in practice.	different areas such as Finance, Personal, Marketing, Purchasing, storing etc.
1.5	System Approach (I) Definition & parameters	+ Applies the concepts of system approach. - Defines the term system. - Lists the parameters of a system	
	(II) Classification of system	- Define open, closed isolated systems. - Define Productive Non productive and service systems.	

[Handwritten signature]

[Handwritten mark]

28/66

- (iii) System design procedure
- Explains the system design procedure.
 - Give a situation, applies the concepts to design a system.
- (iv) Evaluation of system
- Defines the terms productivity and effectiveness of a system.
 - Justifies the importance of measuring effectiveness of a system.
2. ORGANIZATION AND ORGANIZATIONAL CLIMATE.
- 2.1 Introduction
- Definition & illustration
- * Know about the organization.
- 2.2 Principles of Organization
- Explain the principles of organization.
- 2.3 Organisational structure and organisational chart.
- * Understand the basic elements of organisational structure.
 - Prepare an organisational chart for an organisation.
- 2.4 Types of Organisation
- * Understand different type of Organisations.
 - Distinguish between different types of organization.
 - Show examples of different type of Organization from real life.
- 2.5 Classification of organisation
- * Know the classification of organisations.
 - Classify organisation on the basis of Function, Product, Customer and location.
- Show example of the organisation based on Function, Product, Customer and location.
- 2.6 Authority and Delegation of authority.
- * Know the basic principles of and its delegation.
 - Define authority.
 - Explain process of delegation of authority.
- Centralisation & and decentralisation.
- State the purpose of centralisation and Decentralisation.
- Authority and Responsibility.
- State relationship between authority and responsibility.

K. Singh

[Signature]

28/67

- 2.7 Group Dynamics
- Concept
 - Characteristics of groups.
 - Reason for formation of groups.
 - Types of groups
 - Advantages and disadvantages of groups.
- * Know the concept of group dynamics
 - Define basic characteristics of groups.
 - Explain reason for formation of groups
 - List different type of groups such as formal, informal groups.
 - List advantages and disadvantages of groups.

- 2.8 Organisational change
- Introduction
 - Causes of organisational change.
 - Response to change
 - Process of change
 - Resistance to change
 - Overcoming resistance to change.
- * Applies the concepts of managing change in a given situation.
 - Define organisational change.
 - Identifies the causes of organisational change.
 - Explain the process of change.
 - State the causes of resistance to change.
 - Give a situation & suggests the method of overcoming resistance to change.
- Through case study.

2 copies

- 2.9 Organisational Conflict
- Concept
 - Types of conflict
 - Process/Stages of conflict
 - Source of conflict
 - Resolution of conflict or modes of conflict management.
- * Understand the concept of organisation conflict and its management.
 - Define conflict.
 - Recognise different type of conflicts.
 - * Describe the process of conflict.
 - Identify the sources of conflict.
 - Give the strategies for resolution of conflict.
- Conflict between individuals
 conflict between an individual & group.
 Conflict between groups within an organisation.
 Conflict between organisations.

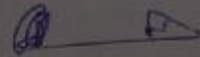
3. HUMAN FACTORS IN PRODUCTION.

- 3.1 Managing Men:
- 3.1.1. Motivation:
- Introduction
 - Factors affecting motivation
- * Understands the importance of motivation.
 - Defines motivation.
 - List the important factors that influence human behaviour.
- Explain about job/ company environment & internal human needs.

28/68

- 3.1.3. Motivation process. - Explains the motivation process. Describe: Aggressiveness, acquisitiveness, self assertion, gregariousness.
- 3.1.3. Secondary motivation drives - Explains the secondary motivating devices.
- 3.1.4. Outlet for drives
 - Expression
 - Repression
 - Control and re-direction.- List outlet for drives
- Explain outlet for drives
- 3.1.5. Behavioural Theories
 - Maslow's need Hierarchy
 - Herzberg Theory
 - Douglas Mc Gregor Theory (Theory X and Y)
 - Personal skill required such as persuasion, influence and Rapport.- Discuss importance of Behavioural Theories.
- Explain behavioural theories.
- 3.1.6. Morale.
 - Definition
 - Importance* Understands the concepts related with Morale.
- 3.1.7. Morale and Productivity.
 - Defines morale.
 - Explains the importance of Morale.
 - Correlate morale with productivity.
- 3.1.8. Job - satisfaction.
 - Importance
 - Factors* Understands the concepts related with job satisfaction.
- Explains the importance of job satisfaction.
- List the factors, to be considered in designing a job, for giving job satisfaction.
- 3.1.9. Training.
 - Concept of Training
 - Need of Training
 - Benefits of training* Understands the concepts of training
- Explains the need of training
- Explains the benefits of training.
- 3.2 Leadership.
 - Definition.* Understand leadership.
- Define leadership.
- 3.2.1. Personal skill required such as persuasion, influence and Rapport. - List the ingredients of leadership.
- 3.2.3. Leadership qualities. - Identify qualities to a leadership.

[Handwritten signature]



28/69

- 3.2.3. Relationship between motivation and leadership. - Establish relationship between motivation and leadership.
 - 3.2.4. Kinds of leadership Traditional
 - Autocratic
 - Democratic
 - Free Rein- List types of leadership styles.
- Describe different types of leadership styles.
 - 3.3. MANAGEMENT BY OBJECTIVES - Knows the concept of MBO
 - 3.3.1. Introduction to MBO - Describes the MBO
 - 3.3.2. Application of MBO
 - Advantages and disadvantages of MBO.- State the various applications of MBO.
- List the advantages and disadvantages of MBO.
 - 3.3. Management Grid - Explain chart of management grid
 - 3.4. Supervision:
 - * Understand the importance of supervision.
 - 3.4.1. Definition of Supervisor's role. - Define the role of Supervisor
 - 3.4.2. Personal attitudes of supervisor. - Identify personal attitudes required in a Supervisor.
 - 3.4.3. Duties and responsibilities of a Supervisor. - List the duties and responsibilities of a Supervisor.
 - 3.5. Time Management:
 - 3.5.1. Importance
 - * Appreciate the importance of time management.- Importance.
- Main features:
a) Learn management and organization principles.
 - 3.5.2. Techniques employed.
 - Steps to be taken.
 - Avoiding time wastes.
 - Communication as pepts.
 - Using diaries.- Explain the Steps which could be taken for Managing the time resource effectively.
- Explain the techniques employed for time management.
- List the various electronic gadgets used for better time management.
- 3.6. Communication:
 - Definition
 - Communication Process* Understand Communication
- Define communication.
- Explain the process of communication

[Handwritten signature]

[Handwritten signature]

28/70

- Communication types
- Communication Channels
- Communication Barriers

- Name the types of communication.
- Describe channels of communication.
- List the barriers in communication.

- 3.1.1. Effective communication
 - Person to Person
 - With Groups
 - In meetings/Committees

- Explain the method of communications with
 - a person
 - in groups
 - in meetings/committees.

- * Writing a letter.
 - Categories of letter.
 - a) Important.
 - b) Routine.
 - Organization of the letter (Four section).
 - i) Information
 - Starting with the most important point.
 - ii) Supporting details, evidence and view.
 - iii) Summary stating the conclusions actions needed to follow.
 - iv) Closure- Thanks giving etc.

- * Knows the concepts related with written communication.
- States the Categories of letter.
- * Describes the organization of letter with suitable example.

- * Memoranda :-
 - Definition.
 - Difference between a letter and memorandum.

- * Defines Memoranda.
- * Illustrate difference between a letter and a memorandum.

- Explain:
- Memos used for interdepartmental communication within an organization.
 - Business letter is an external communication.
 - No salutation at the start and end.

- * Reports :-
 - Definition.
 - Task involved in writing reports to include the following aspects-
 - Collection of material.
 - Selection of material.
 - Ordering sections.
 - Classification of materials.
 - Placing sections in a logical order.

- * Knows about report writing.
- Defines a report.
- List the tasks involved in writing a report.
- Describes the step-by-step procedure of report writing.

[Handwritten signature]

[Handwritten scribble]

28/71

- Deciding headings and sub-headings.
- Writing the report.
- Choosing a style appropriate to the audience.
- Choice of illustrations, table, graphs, diagrams.
- Presentation of the report.

A possible layout may include title page, Summary, table of contents, introduction, text of main body of the report, conclusions, Appendices containing tables, technical conclusions, references etc.

- * Presentation skills.
 - Introduction
 - Scope
- * Verbal Communicating media (Body language)
- * Phases for group interaction.
 - Preparation phase
 - Subject matter
 - Visual aids
 - Psychological (Overcome nervousness)
 - Presentation phase
 - Pace
 - Timing
 - Voice modulation
 - Eye contact
 - Star/ Introductory pleasantries
 - Stress on the main theme.
 - Keeping on track.
 - Closure (Summarize).

- * Understand the importance of presentation skill in group.
- * Explain the important role played by body language in verbal communication.
- * Explain the phases and elements to be taken care in group interaction.
- * Give a situation & display the presentation skills.

interaction and the methodology to be adopted.

- * Body language to include Posture Gesture, voice, Dress

Handwritten signature

3.7. PROBLEM SOLVING & DECISION MAKING.

- 3.7.1. Steps in Problem solving.
 - Define the Problem.
 - Collect relevant information
 - List Possible causes.
 - Select the most likely cause.

- * Understand the process of problem solving and decision making.
- * Explain systematically the steps involved in problem solving.

Handwritten initials

28/72

- Suggest alternative solution.
- Evaluate alternatives
- Choose one solution
- Plan for implementation
- Receive feed back.
- Replan and implement.

- 3.7.2. Methods of Problem solving.
- Institution
 - Analytical thinking
 - Creative Thinking
 - Group discussion and Brain storming.
 - Lateral Thinking.
 - Logic Thinking (Cause-Effect diagram)
 - Synectics.
- Describe the method of problem solving.

- * SWOT Analysis:-
- Definition (Factors involved)
 - Procedure
 - Application areas.
- * Understands the concepts related with SWOT analysis.
- Define the terms.
 - Explain the procedure by illustrating Examples.
 - name areas of application
- S- Strength
W - Weakness
O - Opportunities
T - Threats,

- 3.7.3. Importance of Problem Solving
- Outline the importance of problem solving.

- 3.7.4. DECISION MAKING:-
- Introduction
 - Define decision making.

- 3.7.5. Types of Decisions.
- Classify the decisions in different types.
 - Programmed and Non-programmed decision
 - Major and Minor decisions.
 - Routine and strategic decisions.
 - Organizational and personal decisions.
 - Policy and operation decision
 - Long term, Departmental and Non-economic decisions.

- 3.7.6. Decision Making Process.
- Explain the right process of decision making.

- 3.7.7. Barriers in decision making.
- List & Describe the Barriers in Decision making.

- 3.7.8. Quantitative methods in decision making.
- Introduction.
 - Explain the use and importance of Quantitative methods in decision making.

[Handwritten signature]

[Handwritten initials]

28/73

- Deterministic models
- Break Even Analysis.
- Linear Programming
- Capital Budgeting
- Inventory Management

3.7.9. Probabilistic Models.

- Define Probabilistic models.
- Explain different types of models.

Explain expected value model, decision tree, simulation.

3.7.10. Other Techniques.

- List other commonly used techniques in decision making.
- Explain each of these, with their specific area of application.

Names:
- Waiting line theory
- Game Theory
- Information Theory
- Utility Theory
- Heuristic problem solving.

4. MATERIAL MANAGEMENT.

- Functions of Materials Management system encompassing
(A) The purchasing
(B) Storing and
(C) Inventory control functions
(D) Waste management.

- * Understand the concepts about materials management system in an industry.
- State the areas included in the materials management system.
- Justify the importance of the role of Materials Management system in an industry.

XCM/SL

- (A) Purchasing
 - Objectives of Purchasing.
 - Decisions to be made before purchasing (Apply systems Approach)

- List the objectives of purchasing.
- Give a situation, identify the decisions to be made before the actual purchases are made.

4.2. Material Requisition Planning.

- Definition.
- Importance.
- Factors to be considered.

- Understands the term M.R.P.
- * Explain the importance of material requisition planning.
- * Describes in brief the factors to be considered for material requisition planning etc.

4.3. Buying Techniques such as Batch, Speculative, scheduled and purchasing by sole supplier agreement

- Explain the different types of buying techniques with examples.

①

28/74

- 4.4. Purchasing Procedure
 - * Understand the purchasing procedure
 - Explain the purchasing procedure.
- 4.5. Purchase Documentation
 - know about the different types of formats/related with purchasing
 - state the different types of proformas/formats used in purchasing.
- 4.6. Computerized Purchasing system
 - * Know about the application of computer in purchasing function. Illustrate the application of computer in purchasing.
- 4.7. Purchasing Organization;
 - * Know about the purchasing organization. Organisation based on the principle of:
 - Classify purchasing organization. Function, Product, location & stage of manufacturing.
- 4.8. (B) Stores Management
 - Stores functions
 - stores organization centralized and Decentralized.
 - * Understand the working of stores
 - state the stores functions
 - state the types and characteristics of stores organization.
- 4.8.1. Stores systems and procedures.
 - (1) Identification system
 - Arbitrary approach
 - Symbolic approach
 - State the importance of identification systems related with storage of items in an industry.
- 4.8.2. Standardization, Codification and variety Reduction.
 - * Understand the importance of standardization, Codification and variety Reduction.
 - Explain the terms standardization, Codification and variety Reduction and emphasise their importance.
- 4.9. (C) Inventory control
 - Definition
 - Function of inventory
 - Economic Order Quantity
 - Stock Turnover
 - Definition.
 - Importance.
 - * Understand the concept of inventory control.
 - Define the term inventory
 - State the functions of inventory
 - Derive an expression for the Economic Order Quantity.
 - Understands the term stock Turnover.
 - Defines the term stock turnover ratio.
 - Explain the importance of stock turnover.

K. Combe

(Handwritten mark)

28/75

- 4.9.1. Inventory Models:
Order Quantity, Buffer stock,
Reorder point, Lead time,
Stock out.
 - States its applications on inventory control etc.
 - Define the terms model, inventory model and different terms used in relation to Inventory models.
 - State the functions of inventory models.
- 4.9.2. Fixed Order Quantity Model (Wilson model) without and with bufferstock.
 - Derive an expression for Economic Order Quantity (EOQ).
 - compute EOQ with given data.
- 4.10. Value Engg & Value analysis:
 - Introduction to value Engg. and value analysis.
 - Difference between value Engg. and value analysis.
 - * Scope and objectives
 - * Reasons for unnecessary costs
 - * DARSIRI method for value analysis.
 - Defined the term value, value engg. and value analysis.
 - Gives the types of value.
 - State the objectives of Value Engg.
 - State the reasons for unnecessary costs.
 - Explains the DARSIRI method for value analysis etc.
 - * Concepts can be reinforced by taking a case study.
- 5. Production Planning and control.
 - Introduction
 - Productivity.
 - Definition.
 - Importance.
 - Factors to be considered.
 - * Understand the functions of PPC.
 - Explain the functions of PPC.
 - Understands the concepts related Productivity.
 - Defines the term Productivity.
 - Explain the importance of productivity.
 - Describe in brief the factors to be considered for improving productivity.
 - * Suitable examples can be quoted.
- 5.1 Planning for Men, Machines, Materials, Estimating, Routing, Scheduling, Despatching, Follow-up, Inspection and Evaluation.
 - Sequencing
 - Define the terms sequencing and loading.
- 5.2 Loading and Scheduling
 - Establish that scheduling is preceded by sequencing and loading etc.

K. C. Singh

(Signature)

28/76

- * Critical Ratio.
- Definition.
- Importance.

- Know about critical ratio.
- * Defines the term Critical Ratio.
- States the importance of Critical Ratio in the scheduling of activities etc.

5.3 Types of Production systems; Job, Batch, Mass/Flow, Group Technology, FMS project.

- * Know about Production Systems
- Classify the production systems
- State the characteristics of different types of production systems.

5.4 Determination of optimum/ Economic batch size for production.

- * Understand the method of finding Economic Batch size for production given the necessary data, compute the optimum batch size for production.

5.5 Documents used in production

- * Know about the different types of formats used for PPC in an industry.
- * Display the different type of formats for work used in the PPC and their functions in an industry.

6.0 PROJECT PLANNING BY NETWORK ANALYSIS: Introduction & Definition

- * Understand the concepts of Project Management.

J. C. Mohan

6.1. Steps/Phases of project management;
- Preplanning
- Planning to include scheduling
- Implementation
- Controlling
- Reviewing and updating.

- Define the term project.
- Explain the steps/phases of project management.

6.2. Tools/Techniques applied for project management

- Bar charts & Milestone charts (Gantt chart)
- Network methods, i.e. C.P.M. & P.E.R.T. Development of Network.
- Fullerson's Rule for numbering events.
- Updating, Crashing
- Resource profile
- Resource smoothening/

- Apply the techniques used for Project Management.
- Explain the procedure of drawing a Gantt chart.
- Interpret the Gantt chart.
- Give necessary data & draw the Gantt chart.
- Explain the procedure for developing a Network, Updating and Resource levelling.
- Differentiate between C.P.M. and P.E.R.T.
- Given necessary data, develop the network giving numbers to events according to Fullerson's Rule.

(Signature)

28/77

Resource levelling.

Update the network, draw Resource profile, and smoothen the Resource profile etc.

7. WORK STUDY

- * Introduction
- * Objectives
- * Components - Method study and work measurement.

- * Knows about work study.
- State objectives of work study
- List the types of studies performed in work study.

7.1. Method study

- * Introduction
- * Objectives
- * Steps for method study

- * Understand Method Study.
- States objectives of method study performing.
- Describes procedure of performing method study.
- Applies the concepts of method study in practice.
- Give the situation, performs method study.

7.2. Work Measurement

- Procedure
- Techniques to include the Time study, Work sampling, Predetermined motion time system.

- * Understand Work Measurement.
- Describes procedure of work measurement.
- State techniques of work measurement.

7.3. Principles of motion economy.

- States principles of motion economy.

B. Maintenance, Safety & Pollution control.

B.1 Maintenance of the facilities.

- Objectives
- Types of maintenance such as :
 - Breakdown maintenance
 - Scheduled (Planned) maintenance.
 - Preventive maintenance
 - Condition based/ Predictive maintenance.
 - Running maintenance.
 - Corrective maintenance
 - Design out maintenance

- Understand the concepts about maintenance of facilities.
- State the objectives of maintenance of facilities.
- Correlate the importance of proper maintenance of facilities installed in an industry with the growing competitive market (cost, quality of product and morale of the workers point of view)
- State the different types of maintenance practices and their characteristics.

[Handwritten signature]

[Handwritten mark]

28/78

- B.1.1 Maintenance Documentation such as :
History card, Preventive maintenance schedule etc.
- B.2 Safety
- B.2.1 Introduction
- B.2.2 Accident process sequence to include:
- Lack of control
- Basic causes (origins)
- Immediate causes (unsafe acts or conditions)
- Accident occurrence
- Injury and damage (loss)
- B.2.3 Role of management in the prevention of accidents.
- B.2.4 Safety hazards and their relationship with accidents.
- B.2.5 Safety programs
- B.2.5.1 Reasons for launching safety programs; to include
(a) moral or ethical
(b) legal and
(c) economic
- B.2.5.2 Requisites for accidents
- B.2.6 Prevention to include
(a) Existence of safety policy
(b) Top management support
(c) willingness for allocation of financial support.
- B.2.7 Safety programs to include:
(a) Safety committees
(b) Safety Education and Training
(c) Safety Engineering
- (Safe-work methods,
- equipment,
- processes
- work place and
- working elements.)
- Know about the different types of maintenance records kept in an industry.
- State the different types of records kept about maintenance of facilities and their importance.
- Display formats of different types of records kept in Maintenance department of an industry.
- Understand the importance of safety in an industry.
- Explains the importance of safety in an industry.
- Explains the causes and sequence of occurrence of an accident.
- Explains the role of management in the prevention of accidents.
- Defines the term safety hazards
- Explains the relationship of safety
- State the reasons for launching safety programs in industry.
- Explains the requisites for accidents prevention.
- Explains the step taken in launching safety programs in an industry.
- Explains the aspects considered in safety engineering etc.
- 20/5/78*

28/79

- (d) Safety in job design
- (e) Safety inspection
- (f) Accident investigation and analysis.
- (g) Records and record keeping.

- 8.3. Environment Pollution and control. Understand the concepts about pollution & control.
- 8.3.1 - Factors causing pollution - List the factor causing pollution
- Effects of pollution on human health. - State the effects of pollution on human health.
- 8.3.2 Air Pollution and control Understand the concepts about air pollution and control.
- sources of Air Pollution - List the sources of air pollution
 - Effects of air pollution - state the effects of air pollution
 - Air pollution control and related devices. - explain in brief the methods of air pollution control and devices used.
- 8.3.3 Water Pollution and control Understand the concepts about water pollution and control.
- Introduction
 - classification of water pollutants. - Classify the water pollutants *K. C. M. S.*
 - sources of water pollution - State the sources of water pollution.
 - Control of water pollution - State the methods adopted for the control of water pollution.
- 8.3.4 Noise and its control Understand the importance of noise control.
- Introduction
 - Sources of noise - State the sources of noise
 - Noise control - Explain in brief methods of noise control.
 - Explain the importance of noise control in an industry.
9. APPLICATION OF COMPUTERS IN MANAGEMENT. * Understand the managerial applications of Computers.
- 9.1. Role of Computers in effective performance of various management functions. - Describe the role of Computers in management functions.
- 9.2. Application of Computer in:
- Finance. - List the application of Computers in different functions of management.
- Production. - Explain, how Computers can be used.

(Handwritten mark)

28/80

- Inventories
- Maintenance.
- Marketing.
- Personnel.
- Process-Planning.

- to enhance effectiveness of management of these functions.
- List the commonly used and latest software packages for application of computers.
- List the important features of these packages.

10. NEW TRENDS IN MANAGEMENT.

10.1. TOTAL QUALITY MANAGEMENT

* Ref: Management Quality. Edited by -

* Introduction.

* Understands the importance and related concepts about Total Quality Management. B.S.Dale &

10.2. Stages of development.

- Inspection
- Quality control
- Quality assurance
- Product assurance
- Total Quality Control (TQM)
- Total Quality Management.

- Explain the different stages of development of T.Q.M.

J.J. Plunkett.

10.3. Philip Crosby's five absolutes of Quality Management.

- List the five Philip Crosby's essentials in regard to quality management.

10.4. W.E. Deming's fourteen point approach about improving quality and Deming's PDCA cycle (plan, Do, check, Action)

- States the Deming's approach about improving quality.
- Explains Deming's PDCA cycle.

10.5. The Juran trilogy (Quality-Planning, Control and improvement) and two major kinds of quality management (break through encouraging the occurrence of good things, to attack chronic problems; and control- Preventing the occurrence of bad things, to attack sporadic problems)

- Explains the Juran Trilogy.
- Explains the two major kinds of quality management.

10.6. Feigenbaum's Concepts about total quality cost comprising of -Appraisal cost, Prevention cost and Failure Cost.

- Explains Feigenbaum's approach about total quality.

Handwritten signature and scribbles

28/81

- 10.7. Taguchi Quality System cycle off-line and on-line; and Quadratic (Taguchi) quality/loss function.
- State Taguchi Quality System Cycle.
 - State Taguchi's loss function.
- 10.8. Japanese Quality Management Culture :-
- Kaizen strategy (continuous improvement)
 - Quality Circle
 - Ishikawa's Cause and Effect Diagram (Fishbone Diagram)
- Appreciates Japanese concepts about TQM.
 - State Kaizen strategy.
 - Explains the concept of Quality Circle.
 - Explains the Ishikawa's Cause and effect diagram with suitable illustrations.
- 10.9 Logic Structures
- Definition
 - Purpose
 - Procedure
 - Application area
 - *Steps to use LS.*
- * Understands the concepts related with Logic Structures.
 - Define the term.
 - Explain the purpose and procedure of developing of Logic Structure by giving illustrations.
 - *Write steps, how a logical structure can be used in classroom / lab.*

J. C. Singh

① → ②

28/82

Suggested list of books: ,

1. Belts, P.W., Supervisory Management, 6th edition,
(ELBS with Pitman Publishing, 1994)
2. Khanna, G.P., Industrial Engineering and Management
(Dhanpat Rai and Sons 1995)
3. Koontz, O'Donnell, Weihrich, Essentials of Management,
4th Edition, (Mc Graw-Hill Book company 1986)
4. Indira Gandhi National Open University, module published
for Diploma in Management Course.
5. Buffa, Modern Production operations Management,
7th edition (Wiley Eastern Ltd., 1983)
6. Goel, B.S., Production Operations Management (Pragati
Prakashan, 1986)

[Handwritten signature]

[Handwritten mark]

28/83

Final Year Diploma in Electronics Engineering (Y-Scheme)
(COMMUNICATION ELECTRONICS)

Subject/Course : Audio/Radio Engineering
Code : ECY-308

Rationale:

The aim of the subject Audio/Radio techniques is to make students familiar with sound transmission/reception techniques, equipment and their uses at transmitting/receiving end.

The course deals with operation, testing, alignment, trouble shooting and maintenance of equipment used at Radio transmitter and receiving station.

The course also cover basic transmission techniques and their generation and detection circuits.

The course has been designed to meet the employment need of All India Radio Stations and various transmitting centres for the level of test/service engineer, supervisor, maintenance technician. It also promote the self employment in repair & maintenance of radio receivers and associated circuits.




28/84

Final Year Diploma in Electronics Engineering (Y-Scheme)
(COMMUNICATION ELECTRONICS)

Subject/Course : Audio/Radio Engineering
Code : EGY-308

Scheme of Studies (Hrs. distribution) :

S.No.	Topic	Hrs. Distribution		
		Theory	Practical	Total
A. AUDIO ENGINEERING:				
1.	Sound transducers	18	6	24
2.	Sound recording and reproduction	18	10	28
3.	Sound transmission	10	18	28
B. RADIO ENGINEERING:				
4.	Radio transmission	12	12	24
5.	Radio reception	6	18	24
Total		64	64	128

Table of Specification for Assessment:

S.No.	Topic	K	A	C	T
A. AUDIO ENGINEERING:					
1.	Sound transducers	8	6	-	14
2.	Sound recording and reproduction	2	10	4	16
3.	Sound transmission	4	4	8	16
B. RADIO ENGINEERING:					
4.	Radio transmission	5	9	10	24
5.	Radio reception	10	5	15	30
Total		29	34	37	100

K -> Knowledge A -> Application C -> Comprehension.

[Handwritten signatures and initials]

28/85

Subject : Audio/Radio Engineering

Code No.: EGY-308

S.No.	Topic/Sub Topic	Intended Learning Outcome (ILO)	Remark
A.	AUDIO ENGINEERING		
1.	Sound transducers:	Understand functioning and application of various sound transducers.	
(a)	Microphones		
-	Introduction to microphones, construction, functioning and uses of various microphones.	- Explain the term microphone - Name with a suitable sketch, write the construction of various microphones. - Write the advantages of dynamic microphone. - Differentiate between condenser and carbon microphones. - Explain principle of crystal microphone. - Write the specific use of each microphone. - Types of magnet coil used in microphones. - How many ways a microphone receives the signal. - Draw the polar diagram of dynamic & condenser microphone	
	. Carbon		
	. condenser		
	. crystal		
	. dynamic		
(b)	Loudspeakers	Understand functioning and application of various loudspeakers.	
-	Introduction to loudspeakers	- Explain the term 'Loudspeaker'	
-	Construction, functioning and uses of various loudspeakers	- Name various types of loudspeaker - With a suitable sketch & type the construction of various loudspeakers. - differentiate between tweeters, and co-axial speakers. - write short on loud speaker enclosures - Give the difference between horn and cabinet.	
	. Permanent magnet moving coil		
	. Baffles		
	. horns and woofers		
	. tweeters and woofers		
	. co-axial speakers		
	. loudspeaker enclosure speakers.		

[Handwritten signature]

[Handwritten signature]

28/86

- In what ways a speaker cabinet must be designed for maximum output

- How the signal travels in speakers
- Write the types of magnet used in speakers.

2. Sound Recorders

- Introduction to sound recording.
- Types of sound recording
 - . film reel
 - . tab
 - . cassettes
 - . compact disc
 - . construction of sound recorders.
 - . Operation of sound recorders and its uses.
- Connecting techniques of loudspeaker with diverse power requirements

Students should be able to; understand the working, types and characteristics of different sound recorders and servicing and trouble shooting of such recorders.

Student should be expose to various recorder in the lab with respect to its operation, alignment and controls.

- Describe various methods of sound recording
- Enlist various components of disc drives.
- Write the function of each part of the drive.
- Write the constructional details of pick up areas and track angle error.
- Explain the use of preamplifier for dynamic transducer system.
- Explain the functioning of a compact disc recorder.
- Differentiate between working of disc and tape recorders.
- Write the troubleshooting procedure of sound recorders.
- Enlist typical fault occur in recorders/players.

3. Sound transmission

- Bass and trable control equalizer.
- Hi-Fi system
- Stereo system
- Studio acoustics
- planning and installation of sound system for an auditorium for open air and indoor.

- Explain the working of an equalizer
- Differentiate between bass and trable control equaliser.
- Describe Hi-Fi system with suitable diagram.

[Handwritten signature] 


28/87

- requirements of conference rooms.
- PA system and its installation
 - . Block diagram
 - . choice of system for various application
 - . Distribution arrangements.
- What are the requirements of a conference room respective of sound system.
- How a sound system is installed for an auditorium.
- What is meant by PA system.
- Draw block diagram of a PA system.
- Explain how a PA system is selected for a particular application.
- How load distribution of speakers is arranged.
- What is hauling and how it is removed.
- What is the suitable height of roof to get minimum echo.
- What is word acoustics
- What controls must be used for high & low pitch voices.
- What is echo and how it removed from PA system.

B. RADIO ENGINEERING :

Student should be able to:
Understand the basic principles of radio transmission and reception and its application.

- 4. Radio transmission
 - Draw basic block of radio transmitter.
 - Explain the function of each block
 - Explain how a basic transmitter is aligned.
- 4.1 Basic Radio transmitter
 - Principle
 - Block diagram & function of stages
- 4.2 Modulation techniques
 - Need of modulation
 - Modulation and its type
 - Amplitude modulation theory
 - . AM spectrum
 - . AM representation
 - . Power relationship in AM signal
 - . DSB and SSB, their relative merit & demerits
 - Why modulation is needed
 - Define AM and modulation index
 - Draw AM spectrum and waveform.
 - Derive power relation
 - What is meant by DSB and SSB
 - Compare DSB and SSB

K. S. Srinivasan 

28/08

- . AM generation
- . Basic requirements level comparison
- . Grid modulated class-C amplifier.
- . Plate modulated Class-C amplifier.

- Draw and explain principle of class-C grid modulated amplifier
- Write merits & demerits of plate modulation C amplifier over grid me.
- Draw FM spectrum and define modulation index
- What determines the FM bandwidth.
- Compare direct and indirect FM generation.
- Write note on AFC

5. Radio reception

Understand the principle of various radio receivers, their relative features and application in radio communications.

5.1 Need of reception

- Explain the need of reception

5.2 Types of receiver

- AM receivers
- TRF type
- (a) Block diagram
- (b) Function of stages
- (c) merits & demerits
- (d) frequency changing & tracking
- (e) IF selection
- (f) Automatic gain control
- (g) Principle & working of tuner, IF amplifier & diode detector.

- Draw block diagram of TRF receiver. Explain it in brief.
- Draw the block diagram of superheterodyne receiver. Explain the function of each block.
- Describe frequency changing and tracking.
- Define IF. What are its selection criteria.
- What are the advantages of superheterodyne receiver over TRF
- Define :
 - (a) Sensitivity
 - (b) Selectivity
 - (c) Image frequency
- What is ABC. What are its functions.
- Describe the difference between AM and FM receiver.
- What is meant by 'Amplitude limiting'
- Draw and explain the basic FM modulator circuits.
- Compare FM modulators.

- FM receiver
- . Comparison with AM receivers
- . Amplitude limiting
- . FM demodulators & their relative merits and demerits.

ZCMH 

28/89

5.3 Radio receiver trouble shooting

Student should be able to do alignment, testing and trouble shooting in a radio receiver stage wise with the help of various test equipment.

Student should be expose to alignment, testing & trouble-shooting of radio-receiver in the lab.

- Troubleshooting of various receiver stages with the help of equipment like signal generator, wobuloscope and CRO.
- Alignment & tracking of various stages of a radio receiver (AM & FM)

- What is meant by troubleshooting
- Name various test equipment and its use in radio servicing.
- Write the alignment procedure of various receiver stages.
- Enlist some typical faults occure in receiver & how it troubleshoot.

K. G. K.



28/90

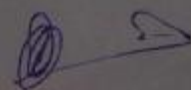
Final Year Diploma in Electronics Engineering (Y-Scheme)
(COMMUNICATION ELECTRONICS)

Subject/Course : Audio/Radio Engineering
Code : EGY-308

List of Practicals:

1. Study of different types of microphones their sensitivity & directivity.
2. Study various types of loudspeaker & their characteristic & application.
3. Study of pre-amplifier and its controls.
4. Study of sound mixer
5. Study of stereo system & controls
6. Study of Hi-Fi system frequency response
7. Setting of a PAL systems.
8. Study of record players, changers and their operation.
9. Study common faults in record player and their rectification.
10. Study of reel to reel recorder and cassette recorder and identification of mechanical and electrical parts.
11. Trouble shooting tape recorders and cassette recorders.
12. Study of complete circuit drawing of PA system & tape recorders.
13. Study of CD player
14. Familiarisation with studio acoustic.

K. C. S. S.



28/21

List of Suggested books:

1. Radio Engineering - G.K.Mittal - Khanna Publications
2. Elements of Radio Servicing - Marcus & Levy - TMH Publication
3. Basic Audio and Radio - Sharma - TMH Publication
4. Electronic Communication System - Kennedy - TMH Publication
5. Operational Manuals of Audio/Radio receivers.

Z. C. M. B.

(Scribbles)

28/92

Final year Diploma in Electronics Engineering. (Y-Scheme)
(ELECTRONICS COMMUNICATION)

Subject/Course : PROJECT-WORK
Code : ECV - 309

Rationale :

Project work is the area in which a student can show his creativity resourcesfulness, knowledge and various skills attained through the labs and work-shop during the course duration.

Project work leads the student to develop his original thinking, group-discussion, leadership, interpersonal relations, inter disciplinary relation and polishes his behaviour in the society.

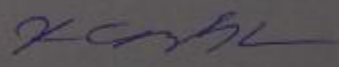
He is also exposed to market-survey for procurement of components, suiting to the circuit, their equivalents, the process of try outs of circuits, modification of circuit values and finally getting the desired result.

An electronics diploma student has very vast scope of preparing project, as electronics has entered in every walk of life of the society and every hour of one's daily life.

The support of the institution, faculty members, and supporting staff is of paramount importance and their quality is also reflected in the quality of the final shaps of the project.

A good project-work earns credit for all concerned and increase scope of employment/self employment when presented to potential employer. With this view curriculum can not be bound in any limits & boundry on papers. Reasonable freedom has to be given for selecting the project work as far as the project is feasible and ecconomically viable and socially useful.

Only few guide lines have been given for selection of project work.



28/93

Suggested Topics / Areas for preparation of Projects for Electronics Communication :-

- Alphanumeric / Graphic Display Boards with or without using Microprocessor.
- AM / FM Transmitter and Receiver Set for point-to-Point Communications, preferably with some Modern Features.
- Add-on Features for an existing T.V. receiver Sets (i.e. E-Band/Hyper-Band, Multi-screen, Video Games, Remote Control etc.).
- PAL to VGA Converters (to use TV as Computer Monitor) & VGA to PAL Converters (to use Computer Monitor as TV).
- Electronics / Digital Intercom-Exchanges.
- Telephone Handset modifications with some Advance-Features (i.e. Auto-Dialling, Auto-Answering, Memory Dialling etc.).
- Infra-Red Remote / Radio Controls for Domestic as well as Industrial appliances.
- Display, using ADC-DAC for various Appliances.

However, the care should be taken that the project work should depict the following abilities & skills of the student.

1. Identification of project by Market survey and Industrial survey.
2. Selection/Design of a circuit for desired output.
3. Try-out & modification of the selected circuit/given circuit.
4. Design & fabrication of PCB & component mounting.
5. Procurement of components & equivalents.
6. Working skill of fabrication of the cabinet/chassis and mounting components & controls, displays.
7. Testing of product and test report.
8. Market survey for product sales & economic viability of product (for Entrepreneurship)
9. Costing of the Project/Product
 - i) Capital costs
 - ii) Material & production cost (for entrepreneurship)
10. Identify and approach various Agencies for financial and technical assistance (for entrepreneurship)
11. Documentation of project report
 - i) Drafting
 - ii) Sketching
 - iii) Layout
 - iv) Presentation

[Handwritten signature]

[Handwritten signature]

[Handwritten mark]

28/34

Suggested Books & Sources for guidance to student for selection of project work :

1. Electronics Magazines & Journals.
2. District Industries Centre
3. Industrial problems discussed during industry visit /Training.
4. Entrepreneurship Development Board magazine.
5. "Prime Minister Rojgar Yojana" projects from District Collectorate.

Handwritten signature

Handwritten initials

M.P. Board of Technical Education
Bhopal (M.P)

28/95

Approved
B.O.S.
on 29/61

CURRICULUM
OF
FINAL YEAR DIPLOMA IN ELECTRONICS
(Y-SCHEME)
IN

INDUSTRIAL ELECTRONICS

1996
REVISED
BY

POLYTECHNIC DEVELOPMENT UNIT, BHOPAL
(An Indo-German Project)

UNDER

Directorate of Technical Education, M.P.
Bhopal

INDUSTRIAL ELECTRONICS

FIFTH SEMESTER

- * **IEY301** ELECTRICAL MACHINES

- * **IEY302** SOLID STATE DRIVES & POWER CONTROLLERS

- * **ECY/
IEY303** MICRO-PROCESSOR AND APPLICATION

- * **IEY304** INSTRUMENTATION AND PROCESS CONTROL

28/97

Curriculum plan for 16 week
36 Hours per week
Total Hours per semester : 576

M.P. BOARD OF TECHNICAL EDUCATION, BHOPAL.
FINAL YEAR DIPLOMA PROGRAMME IN ELECTRONICS (Y-SCHEME)
(INDUSTRIAL ELECTRONICS)
(To be introduced in 1996 - 97 at PDU Beneficiary Polytechnics)
(FIFTH SEMESTER)

S.No.	NAME OF SUBJECT	SCHEME OF STUDY			SCHEME OF EXAMINATION									
		CONTACT HRS. PER WEEK (SEMESTER)			SESS. MKS.		PROG. ASSM.		BOARD EXAMINATION					
		THEORY	LAB.	TOTAL	TERM WORK	LAB. WORK	I	II	THEORY PAPER	DURA-TION	MKS	PRAC-TICAL	DURA-TION	MKS
IEY301	ELECTRICAL MACHINES	6(96)	4(64)	10(160)	20	35	10	10	1	3 Hrs	100	1	3 Hrs	50
IEY302	SOLID STATE DRIVES & POWER CONTROLLERS.	4(64)	4(64)	8(128)	20	35	10	10	1	3 Hrs	100	1	3 Hrs	50
IEY303	MICROPROCESSOR AND APPLICATION *	4(64)	4(64)	8(128)	20	35	10	10	1	3 Hrs	100	1	3 Hrs	50
IEY304	INSTRUMENTATION AND PROCESS CONTROL.	6(96)	4(64)	10(160)	20	35	10	10	1	3 Hrs	100	1	3 Hrs	50
TOTAL		20(320)	16(256)	36(576)	80	140	40	40	4		400	4		200

NOTE: (1) No. of theory paper : 4
(2) Total theory marks : 400
(3) No. of practicals : 4
(4) Total Pract. Marks : 200
(5) Inplant Training Mk. :
(6) Total mks. of sessional: ~~350~~ 350
Prog. Assessment, Pract. & Inplant Training.

(7) Ratio of theory marks : 400/450
and (Sessional + Prog. Assess. + Practical + Inplant Training marks.)

(8) Total Marks : ~~900~~ 900

(9) Passing marks for
(a) Theory - 53%
(b) Practicals - 40%
(c) Sessionals - 40%
(d) Inplant Training - 50%

* Common for Electronics Communication and Industrial Electronics.

(Signature)
K. C. Mahapatra
29/6/96
K. C. Mahapatra
PDU Bhopal

28/98

Final year Diploma in Electronics Engineering (Y-Scheme)
(INDUSTRIAL ELECTRONICS)

Subject/Course : ELECTRICAL MACHINES
Code : IEY-301

Rationale:

No industry can move a single step without use of Electrical Machines. Electrical Machine viz. Motors, Transformer are extensively used in all types of manufacturing industry to produce driving torque and control systems.

Knowledge of working principle, operational behaviour, control & maintenance of electrical machine is of paramount importance to Electronics technician who is supposed to operate & maintain the Electronic control system used in industry for production of engineering and non-engineering products.

The knowledge of various electrical machines will help a long way to operate-maintain the various drives and control system safely, improving the industrial productivity.

Emphasis has been given on the operational behaviour of these machines with hands on laboratory exposure for this purpose.

[Handwritten signature]

[Handwritten mark]

28/99

Final year Diploma in Electronics Engineering (Y-Scheme)
(INDUSTRIAL ELECTRONICS)

Subject/Course : ELECTRICAL MACHINES
Code : IEY-301

Scheme of Studies:

S.No.	Chapter/Topic	Theory	Practical	Total
1.	D.C.Machines	20	20	40
2.	Transformers	20	16	36
3.	Induction Motors	40	20	64
4.	Synchronous Machines	10	04	14
5.	Special Purpose Motors	06	04	10
		96	64	160

Table of Specification for Assessment:

S.No.	Topic	K	C	A	T
1.	D.C.Machines	7	16	7	30
2.	Transformers	5	10	5	20
3.	Induction Motors	8	15	10	33
4.	Synchronous Machines	5	5	-	10
5.	Special Purpose Motors	5	-	2	7
		30	46	24	100

K → Knowledge
C → Comprehension
A → Application

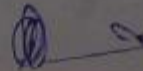
K. Anshu
L. Anand

28/100

Subject: Electrical Machines

Code: IEY-301

S.No.	Topic/Sub Topic	Intended Learning Outcome (ILO)	Remark
1	2	3	4
1.	<u>D.C.Machines</u>	<i>The student will be able to:</i>	
1.1	(a) Working principle of D.C.motor & D.C.Generator (b) Construction (c) Generation of EMF (d) Torque in D.C.Machines (e) Methods of excitations (f) Types of D.C. Machine (g) Armature Reaction (h) Commutation	<ul style="list-style-type: none"> - Explain the working principle of D.C. motor and D.C generator - Enlist the main parts of a D.C. Machine and function of each. - State the expression for E.M.F in armature of a D.C. machine. - state the expression of electromagnetic torque. - give physical interpretation of torque equation. - describe the methods of excitation of D.C. Machine. - Classify the D.C. Machines. - Explain self and separately excited Machines. - explain series shunt & compound D.C. machine. - Define Armature reaction - explain the effects of armature reaction. - describe the methods of decreasing the effect of armature reaction. - know the commutation process in D.C. Machine. - write the types of commutation. - give the reasons of poor commutation. - describe the method for improving the commutation. 	Explain the construction and working of Permanent magnet D.C. motor.



Handwritten signature

28/10/1

1.2 Characteristics of D.C. Generator

- name the main characteristics of d.c. generator.

- (i) Magnetising characteristics.
- (ii) External characteristics.
- (iv) Internal characteristics.

- Draw and explain these characteristics for separately excited and self excited Generators.

1.3 Characteristics of D.C. Motor

- List the main characteristics of D.C. Motor.

- (i) Speed-Armature current characteristics.
- (ii) Torque-Armature current characteristics.
- (iii) Speed, torque characteristics.
- (iv) Speed-HP characteristics

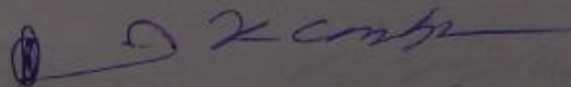
- Draw and describe these characteristic for d.c. shunt, series and compound Motor.

1.4 D.C. Motor Starting

- explain the need of starter in a D.C. motor.
- name the various types of starters for D.C. motor starting.
- explain the working of three point, four point starter for shunt and compound motor.
- explain the working of No-volt release type and no-load release type starter for starting of D.C. series motor.

1.5 Speed Control of D.C. Motor

- Justify the need of speed control.
- name and describe the basic methods of speed control.
- compare the various methods of speed control.
- describe speed control of D.C. Motor with controlled rectifiers.



28/102

- 1.6 Efficiency of D.C. Machines
 - state various types of losses in D.C. Machine.
 - define efficiency.
 - state expression of efficiency for motor and d.c. generator.
 - state condition for maximum efficiency in D.C. machine.
 - calculate efficiency under given working conditions/data.

For understanding numerical example can be assign to the students.

- 1.7 D.C. Machine Applications
 - List various types of enclosures of D.C. Motors.
 - Write application of various types of D.C. Motor and Generator.
 - Select suitable drive motor for industrial application and suggest suitable control scheme for specific load requirement and working environment.

Few examples can be given/shown to the students.

Industrial visit & group discussion. Introduce the International Protection No.system (IP) No.

2 TRANSFORMER

2.1 Introduction

- (a) Definition
 - define transformer as a device
 - define primary and secondary windings.
 - define step up and step down transformer.
 - name the main parts & their functions.

- (b) Working Principle
 - State principle of Transformer action.
 - write expression for E.M.F. equation.
 - State the formula of transformation ratio, and turn ratio.

- (c) Types
 - classify the transformer based on construction and supply voltage.
 - describe constructional details of single phase core type and shell type transformer.
 - compare core type and shell type transformer.
 - State any type transformer

K. C. Mishra
State any type transformer

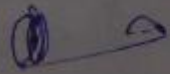
28/103

- (d) Transformer Phasor Diagrams.
 - illustrate vector diagram at no load and under load condition.
- (e) Ratings of Transformer
 - illustrate the meaning of transformer name plate rating.
- 2.2 Equivalent Circuit of a Transformer
 - Produce
 - i) exact equivalent circuit
 - ii) equivalent circuit referred to primary side.
 - iii) equivalent circuit referred to secondary side.
 - iv) approximate equivalent circuit.
- 2.3 Open Circuit and short circuit test.
 - explain the necessity of open circuit and short circuit test.
 - describe the procedure for performing open circuit and short circuit test.
 - Compute parameters of the equivalent circuit.
- 2.4 Voltage Regulation
 - define voltage regulation of a transformer.
 - write the expression for voltage regulation.
 - state effect of poor regulation of transformer on the subsequent circuits.

Numerical problems can be a signal to student to understanding.
- 2.5 Efficiency
 - define and express the term efficiency in terms of losses in a transformer.
 - describe the condition for maximum efficiency of a transformer.
 - define all day efficiency of a transformer.
 - state expression for all day efficiency.
 - state types of cooling system of the various Transformers.

Give numerical example to the students.

K. Singh



28/104

2.6 Auto transformers

- Describe working of auto transformer.
- differentiate Auto transformer with two winding transformer.
- state advantage and disadvantages of auto transformer.
- Write use of auto transformer.

2.7 Three phase Transformer

- relate the construction of 3 phase transformer with single phase transformer.
- illustrate the following connections of 3 phase transformer with symbolic representation.
 - i) Star-Star connection
 - ii) Delta-Delta connection
 - iii) Star-Delta connection
 - iv) Delta-Star connection
 - v) Delta-zig-zag-star
 - vi) Star-zig-zag-star

2.8 Parallel Operation of Transformers.

- Explain the necessity of parallel operation.
- State the conditions for parallel operation in single phase & three phase transformers.

3 INDUCTION MOTORS
POLYPHASE INDUCTION MOTOR

3.1 INTRODUCTION
(a) Construction

- Describe the constructional features of a Polyphase Induction motor.
- name the main parts and their functions.
- name type of induction motor
- name various types of enclosures.

Demonstrate squirrel cage & slip ring induction motor.

X



28/105

(b) Working Principle

- explain the concept of rotating magnetic field.
- describe the principle of operation of 3 phase Induction motor.
- illustrate the analogy of induction motor with transformer.
- define slip and slip speed.
- write expression for
 - i) frequency of rotor current
 - ii) Electromagnetic torque.
 - iii) Power output.

3.2 Characteristics

- illustrate torque slip characteristics.
- show Breaking region, Motor region Generator region.
- illustrate torque slip curves with variable rotor circuit resistance.
- illustrate power slip curve for an induction motor.

3.3 Starting of Polyphase Induction Motor.

- Justify the need of Starting devices
- describe the following methods of starting of squirrel cage motor.
 - i) Direct on line starting
 - ii) Auto transformer starting
 - iii) Star-delta starter
- Compare various methods of starting.
- explain rotor resistance starting method for slip ring motors.

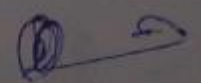
3.5 Speed Control

- justify the necessity of speed control.
- describe various methods of speed control of Squirrel cage and wound rotor type Induction Motor.

The following methods may be illustrated.

- i) Voltage control
- ii) Change the number of poles.
- iii) frequency control.
- iv) Cascade method.

K. Anbu



28/106

3.6 Application

- State the factor for selection of polyphase induction motor for various application.
- give examples of Industrial application of polyphase Induction motor.
- List the various classes of motors and their interpretation for operating temperatures.

Reference to I.P. numbers Industries / factory visits of student may be arranged to show them the practical application.

3.7 Single phase Induction Motors

(a) Introduction

- Justify the need of single phase induction motor for Industrial and other application.
- describe the constructional features of single phase induction motor.
- sketch simple diagram of single phase induction motors.
- illustrate the revolving field theory of single phase Induction motor.
- describe cross field theory of single phase induction motors.
- explain why a single phase induction motor is not self starting.
- Draw and explain Torque speed characteristics of a single phase induction motor.
- explain the effect of rotor resistance on the torque speed curve.

(b) Types of Single phase induction motors.

- classify the single phase induction motor based on method of its starting.
- describe the working of each with phasor diagram.

illustrate:

- i) Capacitor-start induction run motor
- ii) Capacitor start capacitor run motor
- iii) Permanent split capacitor motor
- iv) Shaded pole motor.

K. C. M. P.



28/107

(c) Application

- state need of single phase motors in industrial and domestic applications.
- compare single phase induction motor with three phase Induction motor.

(d) Maintenance

- list the periodical maintenance activities for motors.

4. POLYPHASE SYNCHRONOUS MACHINES

4.1 Construction

- describe constructional details of synchronous machines.
- state that synchronous machine is a doubly excited machine.
- write important features of synchronous machine.

4.2 Working Principle

- explain working principle of synchronous machine as a Generator and as a motor.
- write expression for the generated emf.
- state the terms used in emf equation and their effect.
- Types of rotor- compare- application (motor, generator)
- Draw load characteristics of synchronous generator at three different power factors.
- Define Voltage regulation of an alternator.
- Define synchronous impedance and reactance.

4.3 Excitation systems

- illustrate the schemes of excitation for synchronous machines. illustration may be given using block diagrams of excitation schemes.
- Compare the schemes of excitation.
- state effect of excitation on P.F. on synchronous motor.

4.4 Rating

- Write rating of alternator and synchronous motor.
- explain each terms in the rating.

23/108

4.5 Efficiency

- explain various types of losses in synchronous machine.
- write expression for efficiency of a synchronous machine.

4.6 Application of Synchronous Condenser.

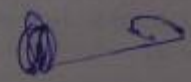
- state the applications of synchronous motor.

explain Synchronous condenser & its uses.

3 Special purpose motors

- Describe construction & working principle of
 - Sclrage motor, *Permanent magnet D.C. motor*
 - Universal motor, *D.C. Servo motor; Stepper motor*
 - reluctance motor.
- State the specific features of these motors.
- Write application of these motors.

[Handwritten signature]



28/109

Final year Diploma in Electronics Engineering (Y-Scheme)
(INDUSTRIAL ELECTRONICS)

Subject/Course : ELECTRICAL MACHINES
Code : IEY-301

Suggested list of Experiments:

1. Study of construction of a D.C. Machines.
2. Magnetising characteristics of D.C. Generators
(1) Series (2) Shunt & Compound.
3. Load speed characteristics of D.C. Motors
3. A. Speed control of D.C. motors
(1) Field control (2) Armature voltage control.
B. Study of 3 point & 4 point D.C. starters.
4. O.C. S.C. Test of Transformer.
5. Load-speed characteristics of Induction motors
(1) 3 phase - Cage motor
(2) 3 phase - Slip Ring Motor
(3) 1 phase - motor capacitor start
(4) 1 phase - motor capacitor start & Run.
6. Study of various types of starters for A.C. motors
(1) D.D.L starters- 1 phase, 3 phase
(2) Star-delta starters manual, semiautomatic, Automatic.
(3) Slip Ring motor starter
Connect & run motor in forward & reverse direction.
4) *Thyristor controlled starter*
7. Operate the A.C. motor in closed loop control system.
8. Operate the D.C. motor in closed loop control system.
(Phase Angle Control)
9. Operate D.C. motor in closed loop control system (P.W.M. method)
10. Draw load characteristic of an alternator
11. Connect and run 1 phase capacitor start Induction motor.

28/110

Suggested List of References/Books:

S.No.	Author	Title	Publisher
1.	I.J.Nagrath D.P.Kothari	Electrical Machines	Tata-Mc Graw Hills Ltd.
2.	P.S.Bimbhra	Electrical Machinery	Khanna Publishers Delhi.
3.	Vincent Deltora	Electrical Machines & Power Systems	Prantice Hall of India Pvt. Ltd.
4.	P.S.Bimbhra	Generalized Theory of Electrical Machines.	Khanna Publishers Delhi.
5.	Edited by Wolfgang Miller	Electrical Power Proficiency course.	GTI
6.	M.S.Say	Alternating current machines theory and performance	
7.	Dawes	Electrical Engg. Volume I Volume II	
8.	B.L.Thareja	Electrical Technology	



28/111

Final year Diploma in Electronics Engineering (Y-Scheme)
(INDUSTRIAL ELECTRONICS)

Subject/Course : SOLID STATE DRIVES & POWER CONTROLLERS
Code : IEY-302

Rationale:

The modern industry is using various types of AC and DC motors to drive the machine tools/system in the production of Engineering & non engineering consumable & other products catering the market need.

These motors are required for precise control of their speed, torque output and duty cycle for various machining operations in all types of industries for which the application of semiconductor devices has been increasing.

As such a deep insight of solid state drives and power controller is to great importance in the present day Electrical/Electronic Engg. courses.

The subject envisages to form a broad base foundation for Electronic circuits and equipment uses for controlling electrical power to variety of rotating machines used in industry.

The power & control circuits forming closed loop control for manual/semiautomatic control, dealt within the subject.

Emphasis has been laid on the practical aspect of the topics rather than analytical treatment of the subject. Sufficient practical hours have been allotted for hands on practicals & demonstrations of various types of drives currently prevailing in the industry.

This will certainly motivate the students to operate and maintain the drives & controllers to improve productivity of the industries and the safety of the drives used therein.

[Handwritten Signature]



28/112

Final year Diploma in Electronics Engineering (Y-Scheme)
(INDUSTRIAL ELECTRONICS)

Subject/Course : SOLID STATE DRIVES & POWER CONTROLLERS
Code : IEY-302

Scheme of studies:

S.No.	Topic	Theory	Practical	Total
1.	Introduction to Modern Solid State Devices.	10	10	20
2.	Basic concept of Drives.	08	04	12
3.	Control of DC Drives	22	16	38
4.	Control of AC Drives	20	14	34
5.	Application of Power Controllers.	04	20	24
		64	64	128

Table of specification for assessment:

S.No.	Topic	K	C	A	Total
1.	Introduction to Modern Solid State Devices.	10	05	04	19
2.	Basic Concept of Drives	03	03	03	09
3.	Control of DC Drives	13	06	08	27
4.	Control of AC Drives	13	06	08	27
5.	Application of Power Controllers.	05	04	09	18
		44	24	32	100

K - Knowledge test
C - Comprehension test
A - Application

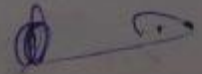
28/11/3

Subject: Solid State Drives & Power Controllers

Code: IEY-302

S.No.	Topic/Sub topic	Intended Learning Outcome (I.L.O.)	Remark
1	2	3	4
1.	Introduction to Modern Solid State Semiconductor Devices.	Student will be able to:	
1.1	Types of devices and symbolic representation.	<ul style="list-style-type: none"> - Identify two layer, three layer & four layer devices. - List various power transistors as Bipolar junction transistor, FET MOSFET, BIMOS, IGBT etc. - List various members of thyristor family e.g. SCR, TRIAC, GTO DIAC etc. - List thyristor as converter grade and inverter grade SCR. 	Lab experiment: study through manual of some of the Solid State devices, their identification and testing.
1.2	Characteristic and terminals of SCR, TRIAC, DIAC.	<ul style="list-style-type: none"> - Draw the static (V-I) characteristic of SCR. - Mark various regions on the curve. - Explain the curve under (i) Reverse blocking (ii) Forward blocking - Define Latching current and Holding current through the curve. - Define the term VFBO & VRBO through the curve. 	Lab Experiment: Demonstration through lab experiment. Give effect of temperature.
1.3	Dynamic characteristic and Turn-on, turn-off of Thyristor.	<ul style="list-style-type: none"> - Define turn-on and turn-off. - Draw and explain the dynamic characteristic (i) During turn-on (ii) During turn-off - Identify the turn-on and turn-off time. - Justify the need for snubber circuit. - Explain the term commutation. 	

K. C. M. S.



28/11/14

- Explain the following method to turn-on a Thyristor.

- (i) Light turn-on
- (ii) Gate turn-on
- (iii) dv/dt turn-on.
- (iv) Break over voltage turn-on.

Emphasis to be given for methods most commonly need.

- Explain the methods of turn-off as

- (i) Natural commutation
 - (ii) Forced commutation
- List the various methods of forced commutation
- (i) Self commutation - class-A
 - (ii) Current commutation - class-B
 - (iii) Complementary commutation - class-C
 - (iv) Voltage commutation - class-D
 - (v) External pulse commutation - class-E.

Explain natural commutation taking example of converter circuit and forced commutation of chopper and inverter circuit.

1.4 Thyristor triggering/firing circuit.

- Identify the firing circuit used with thyristor.
- List out the principle feature of firing circuit.
- Describe the working of following firing circuit
 - (i) UJT pulse trigger circuit
 - (ii) Analog triggering schemes
 - (iii) Digital firing schemes
- Identify the various parts of a firing circuit as
 - (i) Synchronising
 - (ii) Current rating
 - (iii) Power rating for a Thyristor.

Experiment to observe waveform of UJT pulse trigger circuit and circuit used in Siemens kit.

1.5 Thyristor rating and protection

- Define the term voltage for a Thyristor.
- Define the term
 - (i) voltage rating & PIV
 - (ii) current rating
 - (iii) Power rating of a thyristor.
 - (iv) dv/dt & di/dt rating. (v) Turn off time.
- List out the possible abnormal condition in a circuit.
- Identify the need of protection against the above abnormalities.
- List the type of protection used with Thyristor circuits

Refering Data book, give rating of commonly used devices.

28/115

1.6 Temperature rise, cooling and mounting of thyristor.

- Recall the IR loss during study of dynamic characteristic.
- Understand cause of temperature rise in devices.
- Understand the need of heat sink.
- Understand the need of mounting of SCR.
- Know the mechanical stability provided by the mounting.
- Identify the types of mounting as
 - (i) Stud
 - (ii) Bolt down
 - (iii) Press fit
 - (iv) Pressure

Demonstrate the types of housing, mounting and heat sink in lab and correlate with data book.

Reference:
Thyristorised Power Controllers by Dubey, Doradla, Joshi and Sinha

1.7 Comparison of devices and operation with higher voltage and current.

- List out the relative advantages and disadvantages of various device i.e.
 - (i) SCR v/s TRIAC
 - (ii) SCR v/s MOSFET
- Justify the need of operation of Thyristor in series and parallel.
- List out the problems of operation in circuits and parallel operation
- Define string efficiency.

Describe the need of static and Dynamic equalisation circuits and of mounting on common heat sink.

2. BASIC CONCEPT OF DRIVES

2.1 Concept, types and comparison of drives.

- Define a drive
- Explain the drive using a block diagram.
- Identify the main parts of drive as
 - (i) Power controller
 - (ii) Prime mover
 - (iii) Load
 - (iv) Control unit.
- Distinguish the drives as mechanical and electrical drives.
- List the comparative advantages and disadvantages of mechanical and electrical drives.

28/116

2.2 Classification and requirement of electric drives.

- List out the types of electric drive
- List the comparative advantages and disadvantages of D.C. and A.C. drives.
- Identify the D.C. motor as shunt, series and compound motor.
- Write basic equation for voltage, torque and back emf in D.C. motor.
- Draw and explain the speed torque and current torque characteristic for these motor.
- Explain the features of these motors on the basis of characteristic.
- List the main features of A.C. motors on construction and maintenance.
- Identify limitations of D.C. motor
- List classification of A.C. motor
- List out important features on the basis of construction and characteristic.

2.3 Fundamental parameters of speed control of D.C. and A.C. drives.

- List out control parameters for speed from fundamental equations.
- Explain the effect of variation in voltage, flux and armature resistance on speed.
- Describe the selection of control parameters due to load requirement.
- Describe the criteria to select a D.C. motor for different load requirements.
- Write the basic equation of speed and torque of 3 phase induction motor.
- State the method of speed control for 3-phase A.C. motors as
 - (i) Pole changing
 - (ii) Stator Voltage control
 - (iii) Variable frequency control
 - (iv) Slip power recovery.
 - (v) Rotor Resistance control. (vi) V/f Constant

Treatment using example of constant torque, variable torque etc.

[Handwritten signature]

28/117

Practical limitations of these methods be discussed.

- Identify the reasons of above methods of speed control used in different types of A.C. motors.
- State the method of speed control for single phase induction motors as (i) Stator voltage control (ii) Series resistance control (iii) Variable frequency control
- Explain the effect of change of parameters on speed in single and three phase.
- Selection of control parameter according to load requirements.

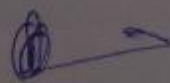
2.4 Breaking and speed reversal in AC and DC motors.

- State the types of breaking (i) Mechanical (ii) Electrical
- State the types of electrical breaking adopted in DC and AC motors (i) Dynamic (ii) Plugging (iii) Regenerative.
- Write relative merit and demerits
- Understand the need for speed reversals.
- Explain the method adopted for speed reversal in (i) DC motors (ii) 3-phase I.M. (iii) 1-phase I.M.

3 CONTROLS OF DC DRIVES

3.1 Schemes of speed control for DC motors.

- Explain phase angle control for Armature and flux voltage control
- List the two schemes for voltage control as (i) Converter fed (ii) Chopper fed
- Give block diagram representation of DC drive.
- Identify the control element.



K. C. M. B.

28/118

3.2.1 Static controlled converter (1-phase and 3-phase)

- State the classification of static converter as
 - (i) 1-phase half wave type
 - (ii) 1-phase full wave centre tapped type.
 - (iii) 1-phase full wave bridge type
 - (a) Semi converter
 - (b) Full converter
 - (iv) 3-phase half wave
 - (v) 3-phase full wave Bridge type
 - (a) Semi-converter
 - (b) full converter
- Draw the circuit diagram of each and explain the working.
- Draw the waveform for each type of static converter with R and R-L load.
- Write the equation for output voltage and current for each of the above with R and R-L load.
- Understand the need of free wheeling diode.
- Explain the effect of using free wheeling diode with R-L load.
- Distinguish the type of diode used for free wheeling (fast acting diode).
- Understand the effect of free wheeling diode in all configurations.

Perform experiment to observe different waveform on various type of converters.

3.2.2 Polyphase converter

- Draw the circuit diagram
- Explain the working using 6 phase configurations.
- State the relation for output voltage & current equations.

3.2.3 Performance parameter

- Give in tabular form the comparative values for efficiency, ripple factor, Transformer utilization factor, Harmonic factor and power factor with the necessary relation.
- Identify the relative merits of single, three and 6-phase system.

Calculation of various parameters using numerical example.

K. C. Mohan



28/119

3.2.4 Converter fed DC Drive

- Give a circuit diagram for speed control using converter using
 - Single phase half controlled converter.
 - Explain the working of above circuit.
- Draw a circuit for 1-phase full controlled converter with DC motor and explain its working.
- State the problem related with 3-phase half wave converter in regard of transformer saturation.
- Draw a 3-phase bridge converter for control of DC drive and explain its working.
- State the condition required for regenerative operation.
- Explain the regenerative operation with four quadrant operation of dual converter.

Treatment with shunt motor.

3.2.5 Speed reversal

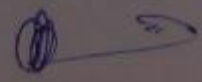
- Explain the method for speed reversal using (a) dual converter in armature circuit. (b) dual converter in field circuit.
- Converter fed DC motor using a contactor in armature or field circuit.

3.3.1 CHOPPERS

- State the basic principle of operation of chopper circuit.
- Understand the concept of step up chopper.
- Understand the concept of multiplier chopper.
- State the method adopted for control in chopper using
 - (i) PWM technique
 - (ii) Frequency modulation techniques.
- Explain the working in both techniques.
- Draw the commutator circuit used in chopper (voltage and current commutation)

Perform experiments on Margains chopper circuit.

R. C. Singh



28/120

- Explain the working with these circuits.
- Classify the chopper based on quadrant operation as class A, B, C and D.
- Classify the chopper on application principle as
 - (i) Margain chopper
 - (ii) John's chopper

3.3.2 Chopper fed DC Drive.

- Draw a circuit for DC motor control using two quadrant chopper.
- Explain the working for above circuit.
- Explain the process of regeneration in this circuit.
- Explain the braking process with this circuit.
- Draw the circuit and explain the working of DC motor controlled by four quadrant chopper.
- Explain the method of speed reversal and regenerative braking in this circuit.

3.4.1 Soft start of DC motor

3.4.2 *Soft start of Ac motor*

3.5 Closed loop control of DC

- Explain the principle of soft start
- State the method adopted with static convertors.
- *State the method using thyristor control*
- Identify the requirement of a closed loop control system for
 - (i) Protection
 - (ii) Improved accuracy
 - (iii) fast response.
- Draw a labeled block diagram representation for closed loop control identifying
 - (i) current limit control
 - (ii) Torque control
 - (iii) Speed control

Protection aspect due to these element should be discussed.

K. Chandra
29/8/96

28/12/1

3.6 Safety aspect in system

- Identify the types of fault due to
 - * Under voltage
 - * Over voltage
 - * over current
 - * Zero field current (field failure)
 - * Circulating current.
- Identify the cause for these fault conditions.
- Explain the protective scheme (Analogue) for
 - * Over voltage protection
 - * Under voltage protection
 - * over current protection
 - * field failure protection
 - * Circulating current protection.

Explanation through Siemens kit.

4. CONTROL OF AC DRIVES

4.1 Control schemes for AC motors.

- List out the schemes as
 - (i) Inverter fed control
 - (ii) Cyclo converter fed
 - (iii) AC regulator fed.

4.2 INVERTER

4.2.1 Concept of Inverter

- State the Basic principle of operation of inverter.
- Classify the inverters as
 - * Centre tapped supply
 - * 1-phase Bridge
 - * 3-phase Bridge
 - * Centre tapped lead (Parallel inverter)
- Draw circuit & explain each types of inverter.
- Explain the working of each configuration.
- Explain the behaviour of inverter with R and R-L load and draw the waveform for voltage and current.
- Understand the use of feed back diode.

Treatment be covered using both transistor and thyristor as switching device.

[Handwritten signature]

28/122

4.2.2 Commutation in Inverter circuits.

- List the types of commutation used with inverter as
 - * Self commutation by resonating load.
 - * Self commutation by L-C circuit.
 - * Charged capacitor switched by another load thyristor.
 - * Charged capacitor switched by an auxiliary thyristor.
 - * External pulse
 - * AC line commutation.
- Explain each type of commutation using circuit diagram.

4.2.3 Applied Inverter circuits.

- Draw the circuit for modified Mc Murray half bridge inverter (Single phase- half bridge)
- Explain the working of the circuit.
- draw the circuit for modified Mc Murray single phase full bridge inverter.
- Explain the working of the circuit.
- Draw the circuit for modified Mc Murray 3-phase half bridge inverter.
- Explain the working of the circuit.
- Draw the circuit for modified Mc Murray 3-phase full bridge inverter.
- Explain the working of this configuration.

4.2.3.1 Voltage control and harmonic reduction in inverter circuit.

- List the various methods for voltage control as
 - * Variation of output by variation in dc input voltage.
 - * Variation of output by modulation control technique within the inverter.
- List the various method of control within the inverter using modulation technique. Siemens trainer kit
6.061 1.16 6.07
 - (i) Single pulse modulation
 - (ii) Symmetrical multiple pulse modulation
 - (iii) Multiple pulse modulation
 - (iv) Sinusoidal pulse width modulation.



28/123

4.2.4 Voltage and current source inverters.

- Explain the working of above mentioned method of modulation techniques.
- State the effect of harmonics in inverter circuit.
- State and explain the working of harmonic reduction using pulse width modulation.
- State the principle of voltage and current source inverters (VSI & CSI)
- Differentiate CSI & VSI.
- State their relative methods and demerits.
- Explain the working principle of operation of
 - (i) 1-phase current source inverter.
 - (ii) 3-phase current source inverter.

4.3 CYCLOCONVERTERS

4.3.1 Cycloconverter principles and

- State the basic principle of single phase and three phase cyclo converter.
- draw the circuit diagram for single phase to single phase cycloconverter
- Explain the working principle of it.
- Indicate the type of waveform at input and output points on the circuit.
- Draw a circuit diagram for conversion of 3-phase to single cycloconverter.
- Explain the working principle and indicate the waveform at the input and output.
- State the ratio between output and input frequencies.
- Draw a circuit diagram for a three phase to three phase cycloconverter.
- Explain the working at input and output and state the ratio between output and input frequencies.

28/124

4.4 AC REGULATORS.

4.4.1 Concept & working of AC regulators.

- State the basic principle of working of AC regulators.
- State the types of control used with the regulators.
 - (i) ON-OFF control
 - (ii) Phase angle control
- Classify the controllers as single and three phase controllers.

4.4.2 Single phase regulators

- Draw and explain the working of directional single phase controller with resistive load.
- State effect of above circuit with R-L load.
- State the type of waveform for input and output with R and R-L load respectively.

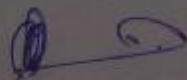
4.4.3 Three phase regulators

- Draw and explain the working of 3-phase half wave regulator.
- State the waveform at input and output for star and delta connected load respectively.
- Draw and explain the working of a 3-phase full wave regulator.
- State the waveform for input and output using star and delta connected load respectively.

4.4.4 Application of AC Regulators.

- State the various industrial application of AC regulators.
 - * Heating
 - * Welding
 - * On load tap changing
 - * Light control
 - * Speed control of AC motors.

4.5 Speed control of AC Drives



23/125

4.5.1 Stator voltage control

- State the principle involved in control of stator voltage.
- State the speed torque curve for variable voltage in single phase and the three phase induction motors.
- State the circuit diagram used for 1-phase and three phase induction motors using AC regulators scheme.
- List the field of applications for single phase and three phase AC regulators.

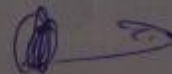
4.5.2 Variable frequency control

- State the speed torque curve for single phase and three phase induction motor for variable frequency.
- Draw the scheme using block diagram for speed control using variable frequency, variable voltage control using DC link inverter.
- Explain the working of the above.
- Draw the circuit diagram for I.M. motor VSI controller with I.M. as load.
- Explain the working.
- Draw the waveform at different point of controller.
- State the application situations in industries.

Refer 1-phase Inverter trainer system with variable voltage and frequency output NW/TC/7A Siemens kit.

4.5.3 Concept of constant v/f ratio

- State the reasons for maintenance of constant v/f ratio in variable frequency controllers.
- State the merits of variable frequency control over variable voltage
 - * Higher efficiency
 - * Reduced current while starting and speed change with maximum torque.
 - * Good dynamic response.
 - * Possibilities of regenerative braking.
- State the process for regenerative braking in I.M.
- State the method adopted in VSI for maintaining of constant v/f ratio.



K. Kumar
Page - 15 -

28/126

4.5.4 Rotor resistance control of slip ring Induction motor.

- Draw and explain the torque-speed characteristic with variation of rotor resistance.
- State the relative merit and demerit with conventional method on
 - * efficiency
 - * control
- State the advantage of speed control by variation of rotor resistance
 - (i) Constant torque like frequency control method even at lower speeds.
 - (ii) Low cost of control in comparison to variable frequency control.

4.5.5 Slip power recovery in slip ring Induction Motor.

- State the static rotor resistance control using a circuit diagram.
- *State resistance control using thyristor.*
- State the concept of slip power recovery in 3-phase slip ring Induction Motor.
- Explain the 3-phase slip ring induction motor.
- State the advantage of the scheme as constant power control.

4.5.6 Synchronous Motor variable Speed drive.

- State the speed relation for synchronous motor.
- State the speed variation by change in frequency.
- Draw the block diagram for speed control using converter-inverter fed drive.
- Explain the working of synchronous motor speed control employing the circuit of cycloconverter for low speed.
- Explain the working of synchronous motor power factor control using the circuit of controlled converter.

28/127

3. APPLICATION OF POWER CONTROLLER

3.1 Field of application

- State the field of application of power controller in
 - (i) High voltage DC transmission
 - (ii) Temperature control and welding equipment.
 - (iii) Lighting control
 - (iv) Domestic application
 - (v) Industrial and agriculture motor controls.
 - (vi) Power factor correction.

3.2 H.V.D.C.

- Give the labeled block diagram for H.V.D.C. transmission system using power controller.
- State the advantage of H.V.D.C.
- State the function of power controller.
- List the type of schemes as
 - (i) DC link
 - (ii) DC line
 - (iii) Monopolar circuits
 - (iv) Bipolar circuits
 - (v) Homopolar circuits.
- State the converter system for H.V.D.C.

3.3 Temperature controller in Resistance heating and welding

- State the parameter controller in resistance heating.
- State the scheme adopted in resistance heating.
- State the welding control used in Resistance welding using a thyristor.

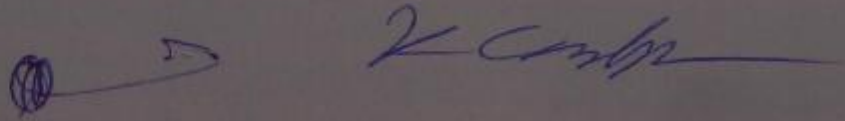
3.4 Lighting & Domestic control

- State the parameter normally controlled for such application.
- Draw the controller scheme for voltage control in single phase devices for lighting.
- Draw the schemes used for single phase F.H.P induction motor in industrial application.

28/128

Suggested list of experiments :

1. Identification of various types of components & their testing.
2. Plot V-I characteristics of SCR.
3. Measurement of holding and latching current of a given SCR.
4. Study of UJT Triggering circuit for 1 phase H.W. convertor and observe waveform at various stages (NW/TC/03-05)
5. Assemble and study of Analog Triggering circuit and observe waveforms.
6. Study of Digital Triggering circuit & observe various waveforms.
7. Study of various types of mounting and heat sink.
8. Study of light dimmer circuit using TRIAC (NW/TC/3-07)
9. Study of 1 phase Half wave and full wave converter and compare the output waveform of both. Demonstrate the effect of free wheeling diode.
10. Study of 3 phase H.W. and Full wave converter.
11. Study of John's chopper & understand the commutation method used therein.
12. Study of Morgans chopper.
13. Study of 1 phase Inverter. Observe its waveform and justify the shape of output voltage.
14. Study of 3 phase Inverter and its firing scheme.
15. Study of parallel inverter circuit.
16. Study of 1 phase to 1 phase cycloconverter.
17. Study of electronic fan regulator.
18. Study of (NW/TC/8A) converter fed DC drive.
19. Study of chopper fed DC drive system.
20. Study of inverter fed AC drive system.
21. Study of Pulse transformer and converter assembly (NW/TC/7A)
22. Study of Isolation and Driving circuit with Transistorised Inverter Bridge (NW/TC/7A-05)
23. Study of Power supply for base drive (NW/TC/7A-06)
24. Study of zero crossing detector & (NW/TC/1-06)
25. Study of synchronised pulse generator circuit (NW/TC/03-01)
26. Study of SCR triggering using I.C. TCA 785, (NW/TC/06-01)
27. Study of under voltage Protection and Pulse Blocking Circuit. (HW/TC/8A-02)
28. To study the PWM chopper controlled circuit module (NW/TC/8B-06)
29. Study of SCR Flasher circuit (NW/TC/03-06)
30. Understand principle of forced commutation (NW/TC/6-09)
31. To study the Field supply and Field Failure Protection circuit. (HW/TC/8A-08)
32. To study the current controller circuit (NW/TC/8A-05)
33. To study the speed controller and speed Feed back lock circuit. (NW/TC/8A-04)



28/129

Suggested list of References/Books:

S.No.	Author	Title	Publisher
1.	Raymond Ramshaw	Power Electronics Thyristor Controlled Power for Electric Motors.	ELBS.
2.	M.S.Berde	Thyristor Engineering	Khanna Publishers.
3.	Muhammad H.Rashid	Power Electronics circuits devices & Application.	EEE PHI.
4.	Sh.G.K.Dubey Sh.S.R.Donalds Sh.A.Joshi Sh.R.M.K.Sinha	Thyristorised Power Controllers	Willey Eastern.
5.	Sh.P.C.Sen	Power Electronics	TMH
6.	G.K.Dubey	Fundamental of Electrical Drives.	Narash Publishing House.

V. Chandra



28/130

Final year Diploma in Electronics Engineering (Y-Scheme)
(Common for Electronics Communication and Industrial electronics)

Subject/Course : MICROPROCESSORS & APPLICATION
Code : ECY/IEY-303

Rationale:

Microprocessor by now have entered in many industrial automation and the number of their applications is increasing rapidly. The use of microprocessor is popular because of its reliability, cheaper in cost, less power consumption, ruggedness & flexibility.

With the introduction of microprocessor a new dimension is provided for digital systems, control systems, designing and diagnostics.

In recent years lot of work has been done on the advancement of microprocessor architecture, application and its communication. It is required to keep pace with this rapid changes. Keeping in view the above the course is designed to acquaint the student with:

- 8 bit, 16 bit, 32 bit, 64 bit microprocessor.
- Present trend of "Microprocessor in industrial application".
- Microprocessor capabilities & limitation
- Microprocessor application in automation etc.

[Handwritten signature]

[Handwritten scribble]

28/131

Final year Diploma in Electronics Engineering (Y-Scheme)
(Common for Electronics Communication and Industrial electronics)

Subject/Course : MICROPROCESSORS & APPLICATION
Code : ECY/IEY-303

Scheme of Studies:

S.No.	Topic	Theory	Practical	Total
1.	Architecture & Programming of 8086/8088.	20	16	36
2.	Microprocessor based data acquisition.	08	08	16
3.	Direct memory address and DMA controllers.	05	04	09
4.	Arithmetic co-processors	04	02	06
5.	Other Microprocessors.	07	02	09
6.	Microprocessor Applications.	20	32	52
Total		64	64	128

Table of specification for assessment:

S.No.	Topic	K	C	A	Total
1.	Architecture & Programming of 8086/8088.	12	06	10	28
2.	Microprocessor based data Aquisition.	04	02	04	10
3.	Direct Memory address and DMA controllers.	04	04	02	10
4.	Arithmetic co-processor	03	01	02	06
5.	Other Microprocessor	05	02	02	09
6.	Microprocessor Application	10	11	16	37
Total		38	26	36	100

K - Knowledge level C - Comprehension level A - Application level

ECY/IEY 303

[Handwritten signature]

[Handwritten signature]
Page - 2 -

28/132

Subject : Microprocessors & application

Code: ECV/IEV - 303

S.No.	Topics/Sub-Topics	Intended Learning Outcome (I.L.O.)	Remarks
1	2	3	4
1	<u>Architecture & programming of 8086/8088.</u>	The student will be able to ;	
1.1	Intel 8086/8088 Hardware specification.	<ul style="list-style-type: none"> * Draw pin diagram of 8086/8088 - Describe the function of 8086/8088 pins. - Describe Logic diagram;Block diagram and Registers - Draw schematic diagram to connect Buffers/Latches to Address and Data Buses. - Draw timing diagram for READ/WRITE bus cycle. - Explain and Interpret the timing diagram. - Describe WAIT/READY state. - List out the mode of operation of 8086 and 8088. - Distinguish "Min" & "Max" mode of operation. 	
1.2	Memory Interface.	<ul style="list-style-type: none"> * Explain the need of memory interfacing in a Microprocessors. - List out various SRAM,DRAM and ROM ICs and identify them. - Decode Memory Addresses. - Use/connect outputs of decoder to select various memory components. - Define Programmable Address Decoders and uses to decode Memory Address. - Explain RAM/ROM interface to 8086/8088 - Interface memory to 8/16/32 bit Data Bus. 	<ul style="list-style-type: none"> * Demonstrate various many to one decoders (which is already been covered in DIGITAL) - Review of commonly used 8086 instructions and programming techniques.

28/133

1.3 Basic I/O Interface

- * Explain Basic I/O Interfacing.
- Define "Hand-shaking".
- Explain the hand-shaking with I/O devices.

1.3.1 Peripheral Programmable Interfacing 8255 (PPI)

- * Draw the pin diagram of 8255 (PPI)
- List out the various modes of operation of (PPI) 8255.
- Assign I/O ports and write control word.
- Interface and programme for 8255.

* Demonstrate Interfacing program for stepper motor controller/ 7-segment display etc. or any such.

1.3.2 Programmable keyboard/Display controller 8279.

- * Draw the pin diagram of 8279 and explain the function of each pin.
- Explain the need of keyboard interfacing and display interfacing.
- Work-out control word and programme for interfacing.

* Demonstrate Interfacing for keyboard (Alpha-numeric) and display.

1.3.3 Programmable Serial Communication Interface 8251-A

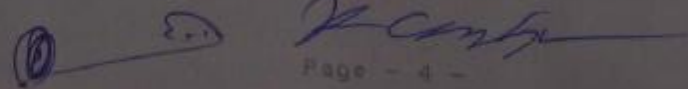
- * Define Synchronous & Asynchronous Serial/data.
- Define the concept of USART and its function.
- Draw schematic block diagram of 8251-A and its pin diagram.
- Identify individual bits in Asynchronous & Synchronous instruction word.
- Explain the functional detail of 8251-A pin.

1.3.4 Programmable Counter/Interval Timer 8253/8254.

- * Draw the pin diagram & schematic diagram of 8253/8254.
- Describe the function details of pin.
- List out various operational modes of 8253/8254.
- Describe each mode of operation.
- Define control word register and identify each bit of the CWR.

* Define the Data-Aquisition systems and justify its utility in industry.

2 Microprocessor based Data Acquisition system.



28/134

2.1 Analog to Digital Converter (ADC).

- * Explain the need of conversion of Analog signal to Digital form.
- List out various ADC ICs.

* ADC 0800, 0803, 0808, 0830 etc.

2.2 Digital to Analog conversion.

- * Explain the need of Digital to Analog conversion of signals.
- List out various DAC ICs.

3. Direct Memory Address and DMA controllers.

- * Describe Direct Memory Address operation
- Explain its need in application.
- Explain DMA request and acknowledge to and from a Microprocessor.

3.1 DMA controller IC 8237

- * Draw the pin diagram of 8237 DMA.
- Draw schematic block diagram of 8237 and explain.
- Enlist various registers in 8237 in 8237 DMA
- Enlist the application of 8237 DMA/8257 DMA.

3.2 Bus operation of DMA

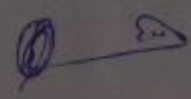
- * Describe Multitasking and Distributed system.
- Define the various buses. (i.e. Local Bus, Shared Bus etc.)
- Draw a block diagram showing local and shared buses.

4. Arithmetic co-processor

- * Describe Arithmetic Co-processor and its need in computer.
- List out the advantages of arithmetic co-processors.
- Convert data between decimal and data type allowed for arithmetic co-processor.
- Distinguish the BCD and Floating point Numbers.

4.1 Architecture of 80x87

- * List various Arithmetic co-processor ICs.
- Draw pin diagram of 80287.
- Describe pin definition of 80287.
- Draw and explain the internal schematic diagram of 80287.
- List out various Registers in 80287



28/135

5. Other Microprocessors.

5.1 80186/80188 and 80286 Microprocessor.

- * State the hardware and software enhancements of 80186/80188 compared to 8086/8088.
- Draw internal schematic diagram of 80186 and 80286.

5.2 80386 and 80486 Microprocessor

- * Enlist the various advance features of 80386 and 80486 over previous Microprocessor family.
- Distinguish 80386-SX and 80386-DX
- Distinguish 80486-SX and 80486-DX.

5.3 ZILOG Z-80

- * Enlist various Registers in Z-80 and its functionalities.
- List out various flags available in Z-80.
- List out various similarities and dissimilarities between Z-80 and 8085 Microprocessor.

5.4 MOTOROLA 6800/68000

- * List out various 8-Bit, 16-Bit, 32-Bit Motorola series Microprocessors.
- Compare MC-6800 with other Microprocessors 8085, Z-80 etc.
- List out various Registers available in MC-6800 and explain Register organisation.
- Describe various status flags of MC-6800.
- List out different modes of addressing in MC-6800.
- Explain Interrupts.
- List the additional features incorporated in MC-68000.

6. Microprocessor application

- * Explain the application of Microprocessors in various industrial and communication field.
- List out typical applications.

[Handwritten signature]

[Handwritten mark]

28/136

6.1 Bus Connectors

- * Enlist various bus connectors
- know the male-type and female type, pin and buss connectors.
- List out the use of various type of connectors.

- * Demonstrate DB-25, CENT 36, RS-232C, RS-232C, IEEE 488, 9-pin TTL, DB-9, DH485.

6.2 7-segment LED Display (Comm.Elks.+Ind.Elks.)

- * Draw circuit diagram for 7 segment LED display using 8255 interface chip for displaying '0' to '9'.
- Write programme for the above circuit and execute.
- write functional table for 7-segment decoder/driver for decimal number '0' to '9'.

- * Demonstrate the function of circuit.

6.3 DC Motor speed and Direction controller (Ind.Elks.)

- * Draw schematic circuit diagram for dc motor speed control and direction control using 8254.
- Describe the function of the circuit.
- Write programme for above circuit for 8085/7-80/8080/8086/8088 and execute it.

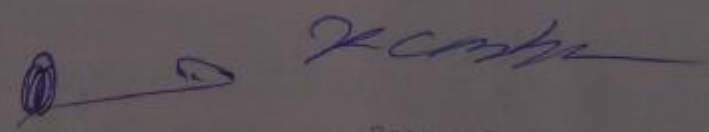
6.4 Stepper Motor Interfacing (Using 8255) (Ind.Elks.)

- * Draw block diagram for interfacing of stepper motor.
- Draw schematic circuit diagram using 8285.
- Write the programme using any Microprocessor and execute it.
- Explain the circuit operation.
- Explain the principle and working of Stepper motor.

- * Constructional detail of Stepper motor and working principle.

6.5 Traffic Controller Model (Using 8255) (Comm.Elks.+ Ind.Elks.)

- * Draw the schematic diagram and port connections using 8255.
- Describe the sequence of operation.
- Write programme for the above mentioned sequence.



28/137

6.6 Store speech and play back through speaker (Using ADC 080X and DAC 08XX) (Comm.Elx.)

- * Draw the block diagram and explain.
- draw schematic circuit diagram
- Prepare flow chart.
- Write programme for above circuit, execute & Run.

6.7 Temperature measurement and control (Ind.Elx.)

- * Enlist the various devices used for temperature measurement.
- Draw the schematic diagram for temperature measurement using ADC 0804 and 8255.
- Explain its operation.
- Draw the program flow chart for this.
- Write the program for this.

6.8 Frequency measurement (Comm.Elx.)

- * Draw the circuit diagram of sine-wave to square wave converter.
- Explain its working.
- Draw the schematic diagram for interfacing of sine wave to square wave converter using 8255.
- Draw the program flow chart for this.
- Write the program for this flow-chart.

6.9 Numeric keyboard/Display Interfacing (Comm.Elx.)

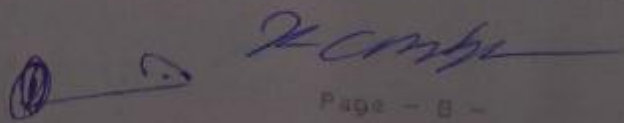
- * Draw Basic block diagram and explain.
- Draw schematic circuit diagram for interfacing.
- Draw flow chart and write Algorithms.
- Write programme, execute and run it.
- Draw key board Matrix circuitry.

Refer Anshuman Guide model Accessories.

6.10 Elevation Simulator (Lift control) (Ind.Elx.)

- * Explain the operation and sequence of an Elevator (lift).
- * Draw and explain the schematic diagram for this.
- * Draw the program flow chart.
- * Write the program and execute.

Anshuman Guide model: Accessories.

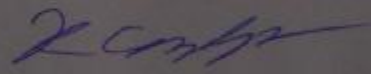
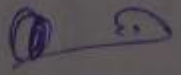


20/138

Suggested list of experiments :

1. Study various parts and incorporated ICs to 8086/8088 Microprocessor system.
2. Write a programme to multiply two 16-bit binary numbers to give a 32-bit result for 8086/8088 and execute.
3. Write a programme to store data in a memory segment 8086/8088 and execute.
4. Write a programme to define the a keys, display the key and the key, "ends the programme" for 8086/8088 and execute (For Key Assignment).
5. Write a programme to transfer a group of data to memory location using PUSH and POP instructions and execute.
6. Write a programme to add 8-Digit BCD number in AX and BX to 8-Digit BCD number in CX and DX, result should be stored in CX and DX. Execute the programme.
7. Prepare Hardware interface for Numeric keyboard/Display for 8085/8086/8088, write a programme and execute.
8. Configure a Microprocessor for 7-segment LED Display. Write the programmes, prepare functional table for decimal number 0-9 and execute. (Comm.Elx. + Ind.Elx.)
9. Control the speed and direction of a dc motor using Microprocessor and 8254. (Ind.Elx.)
10. Using 8255; Interface a stepper motor using a Microprocessors. (Ind.Elx.)
11. Prepare a model of "Traffic Signalling System" using Microprocessor and 8255 (Comm.+Ind.Elx.)
12. Prepare a hardware interface for speech synthesising for Microprocessor to record and playback through a speaker using ADC 080X and DAC 080Y. (Comm.Elx.)
13. Interface a Temp. Controller to Microprocessor using ADC 0804 and 8255 and display temp. (Ind.Elx.)
14. Measure a given frequency using Microprocessor interfacing with 8255 and verify the frequency. (Comm.Elx.)
15. Prepare a model of Elevator/Lift and control it using Microprocessor. (Ind.Elx.)
16. Study the internal hardware circuit of 80286/80386/80486 based Microprocessor with co-processor and without co-processor justify the use of Math co-processor.
17. Program a PLC for stepper motor controlling (if possible)
18. Write programmes for 6800/68000. (if possible)
19. Write programmes for Z-80/Z-800/Z-8000 (If possible)

NOTE The above practicals are suggested by a group of developers of this curricula; However, this list can be changed and moderated according to the facilities and resources available with the laboratory.

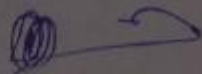



28/33

Suggested list of referances/books:

1. The Intel Microprocessor 8086/8088, 80186, 80286, 80386 and 80486 Architecture, Programming and Interfacing.
- by Barry S. Brey (III Edition)
(Merrill, an imprint of Macmillan Publishing Company, New York, U.S.A Publication)
2. Fundamentals of Microprocessor and Microcomputers.
By- B. Ram.
(Dhanpat Rai & Sons, 1682 Nai Sarak, New Delhi - 110 006 Publication)
3. Microprocessors and Interfacing Programming and Hardware.
By- Douglas V. Hall
(Tata McGraw Hill Publishing Co. Ltd.)
4. An Introduction to Microprocessors.
- By Aditya P. Mathur.
(Tata Mc Graw Hill Publishing Co. Ltd.)
5. PC-Based Instrumentation
- by Tooley
(B-H, Newnes Publication, OXFORD, U.K.)
6. Architecture
- by R.S. Gaonkar
(Willey Eastern Publication)
7. Reference Manuals (User's Guide) - ANSHUMAN
- PEGASUS V-85
- 86-88/U-86
- Accessories

K. K. Mathur



28/140

Final year Diploma in Electronics Engineering (Y-Scheme)
(INDUSTRIAL ELECTRONICS)

Subject/Course : INSTRUMENTATION AND PROCESS CONTROL
Code : IEY - 304

Rationale:

It is difficult to name any branch of science and engineering where measurement instrumentation is not at work recovering the vital information on which much of our engineering progress depends. To serve the ends in Electrical and electronics engineering; advanced instrumentation of increasing speed and complexity is being used in various industrial applications.

The field of instrumentation may be divided in to two main segments. One relates to measurement and other relates to control. The integration of these two areas is attempted through strong emphasis on their interrelationship and elaboration of their respective merits.

The contents of this subject are intended as a text material for one semester subject/course at Diploma level. The contents chosen are such that it covers the major aspects of the subject for a Diploma student. The sequencing and the internal organisation of contents is such that it permits flexibility of adoption to variation in students. A considerable number of experiment have been suggested to give firm background of various process and instrumentation in industries.

Handwritten signature

Handwritten initials

28/141

Final year Diploma in Electronics Engineering (Y-Scheme)
(INDUSTRIAL ELECTRONICS)

Subject/Course : INSTRUMENTATION AND PROCESS CONTROL
Code : IEY - 304

Scheme of Studies :

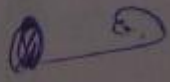
S.No.	Topic	Theory	Practical	Total
1.	Introduction	02	-	02
2.	Sensors & Transducers	24	10	34
3.	Signal Conditioning and Processing.	14	10	24
4.	Display Devices and Recorders.	16	12	28
5.	Control System	20	16	36
6.	Programmable Logic Controllers (PLC)	20	16	36
Total		96	64	160

Table of Specification for Assessment:

S.No.	Topic	K	C	A	Total
1.	Introduction	05	-	-	05
2.	Sensors & Transducers	10	05	05	20
3.	Instrument Amplifier and Signal conditioning	10	05	05	20
4.	Display Devices and Recorders	05	05	05	15
5.	Control Systems	10	05	05	20
6.	Programmable Logic Controllers (PLC)	10	-	10	20
Total		50	20	30	100

K -> Knowledge C -> Comprehension A -> Application.

[Handwritten signature]



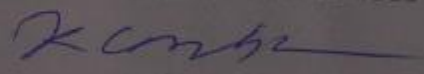

[Handwritten signature]
Page - 2 -

28/142

Subject : Instrumentation and process control

Code : IEY - 304

S.No	Topic/Sub Topic	Intended Learning Outcome (ILO)	Remark
1	2	3	4
1	<u>Introduction to Instrumentation & Process Control.</u>	Student will be able to:	
1.1	Need of Instrumentation and Control.	<ul style="list-style-type: none"> - Define the instrumentation - Explain the term control 	
1.2	Functional block of Instrumentation.	<ul style="list-style-type: none"> - Draw the block diagram of instrumentation system. - Explain the function of each block - Give the requirement for each block 	
2	<u>Sensors & Transducers</u>		
2.1.1	Introduction	<ul style="list-style-type: none"> - Define transducer - State principle of transduction 	
2.1.2	Transducers & Application	<ul style="list-style-type: none"> * Classify the various types of Transducers. - List and give specific applications of the transducers for the following measurements: <ul style="list-style-type: none"> - Displacement measurements - Level measurements - Strain measurements - Pressure measurements - Temperature measurements - <i>Voltage & Current</i> 	<ul style="list-style-type: none"> * Recall the various transducers studied in subject EV-204
2.2	Measurement of Force		Comparative study of these methods.
2.2.1	Introduction	<ul style="list-style-type: none"> - Define Force and its parameters - List the situations requiring force measurement. 	
2.2.2	Load Cell	<ul style="list-style-type: none"> - Explain the concept of load cells. - List the various types of load cells. - State the principle of working of tensile compressive cell (column type) proving rings, cantilever beam load cell, Hydraulic load cell. 	Load cell can be shown to the students during industries visit.

28/143

2.2.3 Electronic Weighing system

- Draw the block diagram of electronic weighing system.
- Explain each block
- State the Industrial application of Electronic weighing system.
- List the advantages of electronic weighing system over the mechanical weighing system.

2.3 Measurement of Torque

2.3.1 Introduction

- Define Torque
- Name the areas requiring torque measurement .

2.3.2 Methods of measurement

- Enlist the various methods of torque measurement.
- State principle for
 - a) absorption type torque measurement.
 - b) deflection type measurement (Mechanical, electrical)
 - c) electronic torque measurement

2.4 Measurement of Frequency

2.4.1 Introduction

- State the principle used for the frequency measurement.
- Draw schematic block diagram for frequency measurement.

2.4.2 Low and medium frequency

- List the methods used for low & medium frequency measurement.
- Describe the operation of Digital Frequency Meter.

2.4.3 High Frequency

- Name the methods used for high frequency measurement.
- Knows the areas requiring the high frequency measurement.
- List the factor affecting the measurement of high frequency.

K. C. ...

28/144

2.5 Measurement of Velocity

2.5.1 Introduction

- Differentiate between linear and angular velocity.

2.5.2 Measurement of linear velocity (Electronic Transducers)

- Explain the principle of operation of Electromagnetic transducers.
- Describe the working principles of
 - Moving magnet
 - Moving coil
 - Siesmic type transducer.

2.5.3 Angular velocity Electromagnetic tachometer Generators (D.C. tachometer/ Generator)

- Name the situation requiring angular velocity measurement
- Name the methods used for angular velocity measurement.
- Describe the working principle of D.C. type techo with generator.
- give advantages and disadvantages of D.C.type Tachometer generator

A.C. tachometer generator

- Describe the working principle of AC tachometer generator.
- Explain the working principle of Drag cup Rotor AC tachogenerator.
- give advantages & disadvantages & disadvantages.
- Describe the working principle of photoelectric tachometer.
- Explain the working principle of stroboscope.
- Describe the use of stroboscope for measurement of shaft speed.
- State the advantages and disadvantages of stroboscopic method of speed measurement.

- Stroboscope

2.6 Measurement of vibrations

2.6.1 Introduction

- Justify the necessity of measurement of vibration.
- State characteristics of vibration
- Give the effect of vibration.

28/11/45

2.6.2 Methods of measurement

- Seismic transducer

- Draw the sketch of a seismic transducer
- Explain its applications in displacement and acceleration models.

- Accelerometer

- Name the types of accelerometers.
- State the working principle of
 - a) potentiometric type
 - b) LVDT
 - c) piezo electric accelerometers.

2.7 Measurement of Flow

2.7.1 Introduction

- Define flow
- Describe concept of flow measurement

2.7.2 Types of meters

- Classify the types of flowmeters
- Explain the principle of electromagnetic flowmeter.
- Explain the principle of ultrasonic flowmeter.
- Explain the measurement of flow rate by
 - a) hot wire anemometer
 - b) Thermistors

3 Instrument Amplifiers and signal conditioning.

3.1 Input Modification

- State input modification as current to voltage, Impedance level etc.
- List the components for input modification as a.c.preamplifiers, d.c. preamplifiers, equalized preamplifiers, input filters, impedance matching and attenuator network.
- State the need of input modification.
- Give a labelled block diagram for D.C. and A.C. signal conditioning systems.
- State the need for balance bridge inputs.
- State the need of signal generator with different waveformation. * Preview
- State the use of shielding wire. * Preview.

28/146

3.2 Pre-amplifiers

- State the use of signal pre-amplifiers for signal level change, equilisation, impedance matching etc.
- Explain the function of A.C. pre-amplifiers.
- Explain function of D.C. pre-amplifiers.
- State and explain the use of electrometers.
- State the situation requiring impedance matching.
- State schemes adopted for impedance matching.

* Explain the conditions for preamplifier to be used in instrumentation.

3.3 Input attenuators and filters.

- Identify the situations for use of attenuators and filters in input signal.
- Describe the attenuation with precision resistance.
- State the situation for isolation of signal.
- State schemes used for isolation of signals.
- State the situations for application of filters.
- Classify the types of filters.
- State the function of equilization and its advantage.

* Preview.

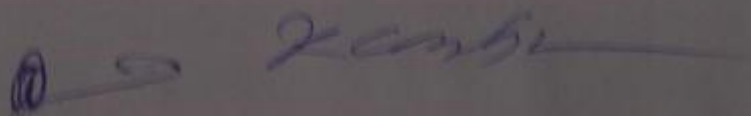
3.4 Instrument amplifiers

- State the needfulness of instrument amplifiers.
- State basic characteristic of an instrument Amplifier.
- Explain its effect on its performance.
- State the need and use of -ve feed back in instrument amplifier.
- Differentiate the amplifiers used as preamplifiers and instrument amplifiers.
- List the various types of amplifiers used as instrument amplifiers.
- State as situations for application of these amplifiers.

- A.C. amplifier, low level D.C., Chopper, Chopper stabilized, Magnetic etc.

28/147

- 3.5 Modulation and Demodulation
 - State the need for modulation and demodulation.
 - State the types of modulation/ demodulation adopted for instrumentation
 - Draw the circuit for Amplifier, Frequency, Phase and Pulse width modulation and explain.
- 3.6 Data Conversion and Multiplexing:
 - State the need for data conversion.
 - Give and explain the schemes for A-D and D-A conversion. * Preview.
 - State the need for Multiplexing
- 4 Display Devices and Recorders
- 4.1 Introduction
 - State the need for display and recording in instrumentation.
 - State the types of output available as single number, time domain, machine interpretable etc.
 - Classify the output as analog and digital types.
- 4.2 Analog Instruments
 - Classify the various analog instruments based on quantity measured.
 - Classify the instrument based on electrical and electronics principle of operation.
 - State and explain the characteristics describing behaviour of analog type of instruments.
- 4.3 Digital Instruments
 - Compare a digital instrument with analog types.
 - State the various display systems used in digital instruments.
 - Compare various display systems.
 - Draw the labeled block diagram of digital measuring instrument.
 - State the function of each block
 - State the criteria for selection of a digital instrument.



28/11/8

4.4 Recorders

- State the requirement of recording system.
- Classify the various types of recording systems
 - Analog, F.M. Modulation, P.D.M., Digital tape recording.
- List the types of analog recorders.
- Classify the graphic recorders.
- Explain the working of strip chart chart recorder.
 - Potentiometric type
- Explain the working of X-Y recorder.
 - Review.
- Explain the method adopted in oscilloscope recording.
- Give a labeled block diagram for magnetic tape recorder.
- Explain frequency modulation recorders using block diagram.
- Explain P.D.M. using a block diagram.
- Compare the direct, frequency modulation, P.D.M. and digital recording system.
- State the types of devices used for display in digital system.

5 Control Systems

5.1 Introduction

- Define a control system
- Define and explain an open loop control system.
- Define and explain a closed loop control system.
 - Explain with the help of block diagrams.
- Compare open and closed loop systems.
- Justify the necessity of a control system.
- Name types of control systems used in industries.

5.2 Block diagram

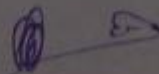
5.2.1 Terminology

- Define
- Reference input
 - actuating signal
 - controlled output
 - feedback signal
 - forward path
 - feedback path
 - open loop gain
 - closed loop gain
 - summer/error detector.

[Handwritten signature]

28/149

- 5.2.2 Procedure of drawing
- Draw the block diagram for a simple system.
- 5.2.3 Block diagram algebra
- State the rules for block diagram reduction
 - Resolve a given block diagram and obtain its transfer function.
- 5.3 Analogies for different control systems.
- List the ideal elements used in mechanical translation and rotational systems.
 - Give the analogies between an electrical system and a
 - a) mechanical translation system
 - b) mechanical rotational system
 - c) liquid level system
 - d) pressure system
 - e) thermal system
- 5.4 System performance
- 5.4.1 Test signals
- State and explain the standard test signals like unit step, unit ramp, unit parabolic and unit impulse signal.
- 5.4.2 Control System requirements
- Define stability, absolute and relative stability.
 - Explain the need of a stable system
 - Differentiate between steady state and transient response.
 - Define steady state error and damping.
 - Define rise time, settling time, peak overshoot, peak time.
 - Define an automatic regulating system, process control system, adaptive control system.
- 5.5 Components of a control system
- State the need of sensor, error detector and actuator in control system.
- 5.5.1 Error detectors
- List the error detectors used in control systems.
 - Explain the use of potentiometers as error detectors.
- Configuration with multiinput.
- Illustrate with the help of table.
- for second order system with graphical representation only.



[Handwritten signature]

28/150

5.5.2 Actuators

Servomotors

- List the actuators used in control systems.
- State the meaning of term servo as used in control systems.
- State the principle of
 - a) Armature controlled d.c. servomotor.
 - b) Field controlled d.c. servomotors
 - c) A.C. servomotors.

- Synchro

- Compare the characteristics of various servomotors.
- Give the applications of servomotors

- Stepper motor

- Explain the working principle of synchro with diagram.
- List the applications of synchro.
- List the applications of stepper motors.
- State the characteristics of stepper motors.

5.5.3 Sensors

- Explain the use of tachogenerator as a sensor in control systems.
- State the use of CT and PT as sensing elements
- State the function of synchro as a sensing device.

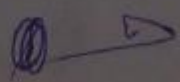
illustrate and explain using appropriate examples.

5.6 Control actions

5.6.1 Introduction

- Define control action
- Classify the various modes of control as
 - a) Two position or on-off control
 - b) Proportional control
 - c) Integral control
 - d) proportional plus Integral control.
 - e) proportional plus derivative control.
 - f) proportional plus derivative plus integral control.

illustrate PID action with the help of PID controller.



28/151

- Explain the function of an automatic controller using a block diagram.
- Define PID parameter terms & their significance.

5.6.2 Control actions

- Explain the various control actions mentioned above with the help of block diagrams.
- Describe the effect of on-off, P,I,D, PI, PD, PID controls on system performance.
- Compare the various control actions
- State the factors responsible for selection of a control action.
- List the components/devices used for P,I,D controls.

illustrate only with the help of input and output characteristics.

6. Programmable Logic Controller (PLC)

6.1 Designation of Electrical Control system

- * List out the various Electrical control systems
- Describe the control sequences.
- Describe Matrix-Board/Selector-switch connections.
- Explain the Hard-wired connections for controlling sequences.

- * Explain and demonstrate the industrial controlling sequences without using a PLC.

6.2 Introduction to PLCs.

- * Explain the need of PLC in industrial applications.
- Explain function of PLC
- State various advantageous features of PLC compared to Hard-wired connections.
- List out the various components of a PLC (i.e. Hardware, Software, Sensors, Actuators and Programmer)
- Explain each of the component and its utility.

- * Will show the functioning of a system with/without PLC and make students aware of the plus features with PLC system.
- Demonstrate a PLC and its components using Model, Charts, OHP etc.

6.3 Programmable Controllers and Specifications

- * Describe the various types of PLC (i.e. compact type, Modular type)
- Explain the various configuration - specification of a PLC. (i.e. Memory, I/O channels, counters relays etc.)

- * Show a specification chart of PLC (commercially available).

28/152

6.4 PLC Programming

- Draw Block-diagram of a PLC system.
- Specify the PLC as a system block and its functionality.
- Explain Address counter, Image Resistor, Intermediate Memory, I/O channels etc.

- * State the function of the programming device.
- Enlist the various types of programming devices (i.e. Hand-Held programmer, Stand Alone programmer, Computer programmes)
- List out various PLC programming methodologies.
- Explain ladder diagram and its needfulness.
- Describe the properties of ladder language, Programming (i.e. Ladder Logic, Boolean Logic, Function Block and sequential Function Chart.)
- Identify the features of different PLC programming languages.

- * Explain Ladder Logic, Boolean Logic, Function Block, Sequential Function.
- Demonstrate various Programmer Modules.
- * Demonstrate example of each type of programming.

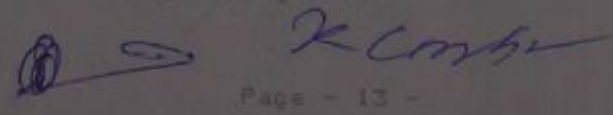
6.4.1 Ladder Diagram

- * Enlist various ladder-diagram symbols.
- Describe the frame work of a ladder diagram and its usefulness.
- Draw equivalent wiring diagram for a ladder diagram (simple circuit)

6.5 Programming the PLC

- * Describe the typical I/O numbering system.
- State the properties of ladder logic programmers.
- Draw simple ladder logic diagram
- Interpret any given Ladder Logic programme and sequence of operation.
- Prepare I/O table from a ladder logic programme.

- * Preview of Ladder diagram.
- Demonstrate to write a programme, interpret each symbol and preparing I/O table with port name and I/O number.



28/153

6.5.2 Boolean Logic Programming

- * Enlist various Boolean function set and mnemonics and its interpretation.
- Give the list ladder equivalent of Boolean set.
- State the special feature of Boolean Logic Programming.
- Interpret the sequence of operation from Boolean Logic set (Programme).
- Write a simple Boolean Logic set.
- Explain Boolean Logic set as statement list (STL)
- * Demonstrate the operation of a PLC with some programme (if possible)

6.5.3 Function Block

- * Describe the features of Function Block programming.
- Describe the significance of Function Block as High-Level-Language.
- State the reason for combining Ladder and Function Block.
- Write a simple programme and explain.
- Explain function chart programming with some example (FCH)
- * Demonstrate to write simple it into all the forms of programming.

6.5.4 PLC Configuration

- * Describe Open-Loop and Closed Loop control circuit.
- State the function of PLC-counter/Timer in circuit.
- Explain operation of PLC-counter/Timer.
- Explain programming of PLC-counter/Timer.
- Define and enlist the operation mode of a PLC.
- Describe the basic communication between PLC-PLC and PLC computer.
- Configure a simple PLC-system for input section with galvanic isolation, filters and various voltage level adaption.
- * Preview of control action.
- Demonstrate the Counter/Timer configuration method and use in circuit.
- Show the communication between PLCs and Computers (if possible).

K. Combr

28/111

Final year Diploma in Electronics Engineering (Y-Scheme)
(INDUSTRIAL ELECTRONICS)

Subject/Course : SOLID STATE DRIVES & POWER CONTROLLERS
Code : IEY-302

Rationale:

The modern industry is using various types of AC and DC motors to drive the machine tools/system in the production of Engineering & non engineering consumable & other products catering the market need.

These motors are required for precise control of their speed, torque output and duty cycle for various machining operations in all types of industries for which the application of semiconductor derives has been increasing.

As such a deep insight of solid state drives and power controller is to great importance in the present day Electrical/Electronic Engg. courses.

The subject envisages to form a broad base foundation for Electronic circuits and equipment uses for controlling electrical power to variety of rotating machines used in industry.

The power & control circuits forming closed loop control for manual/semiautomatic control, dealt within the subject.

Emphasis has been laid on the practical aspect of the topics rather than analytical treatment of the subject. Sufficient practical hours have been allotted for hands on practicals & demonstrations of various types of drives currently prevailing in the industry.

This will certainly motivate the students to operate and maintain the drives & controllers to improve productivity of the industries and the safety of the drives used therein.

Z. Konte



28/11/2

Final year Diploma in Electronics Engineering (Y-Scheme)
(INDUSTRIAL ELECTRONICS)

Subject/Course : SOLID STATE DRIVES & POWER CONTROLLERS
Code : IEY-302

Scheme of studies:

S.No.	Topic	Theory	Practical	Total
1.	Introduction to Modern Solid State Devices.	10	10	20
2.	Basic concept of Drives.	08	04	12
3.	Control of DC Drives	22	16	38
4.	Control of AC Drives	20	14	34
5.	Application of Power Controllers.	04	20	24
		64	64	128

Table of specification for assessment:

S.No.	Topic	K	C	A	Total
1.	Introduction to Modern Solid State Devices.	10	05	04	19
2.	Basic Concept of Drives	03	03	03	09
3.	Control of DC Drives	13	06	08	27
4.	Control of AC Drives	13	06	08	27
5.	Application of Power Controllers.	05	04	09	18
		44	24	32	100

K - Knowledge test
C - Comprehension test
A - Application

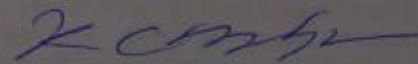
[Handwritten signature]

28/11/13

Subject: Solid State Drives & Power Controllers

Code: IEY-302

S.No.	Topic/Sub topic	Intended Learning Outcome (I.L.O.)	Remark
1	2	3	4
1.	Introduction to Modern Solid State Semiconductor Devices.	Student will be able to:	
1.1	Types of devices and symbolic representation.	<ul style="list-style-type: none"> - Identify two layer, three layer & four layer devices. - List various power transistors as Bipolar junction transistor, FET, MOSFET, BIMOS, IGBT etc. - List various members of thyristor family e.g. SCR, TRIAC, GTO, DIAC etc. - List thyristor as converter grade and inverter grade SCR. 	Lab experiment: study through manual of some of the Solid State devices, their identification and testing.
1.2	Characteristic and terminals of SCR, TRIAC, DIAC.	<ul style="list-style-type: none"> - Draw the static (V-I) characteristic of SCR. - Mark various regions on the curve. - Explain the curve under (i) Reverse blocking (ii) Forward blocking - Define Latching current and Holding current through the curve. - Define the term VFSO & VRBO through the curve. 	Lab Experiment: Demonstration through lab experiment. Give affect of temperature.
1.3	Dynamic characteristic and Turn-on, turn-off of Thyristor.	<ul style="list-style-type: none"> - Define turn-on and turn-off. - Draw and explain the dynamic characteristic (i) During turn-on (ii) During turn-off - Identify the turn-on and turn-off time. - Justify the need for snubber circuit. - Explain the term commutation. 	



INDUSTRIAL ELECTRONICS

28/157

SIXTH SEMESTER

- ✓
IEY305 POWER SUPPLY
- IEY306 P.C. OPERATION
- IEY307 INDUSTRIAL ORGANISATION & MANAGEMENT
(I.O.M)
- * IHEY308 REPAIR MAINTENANCE & TESTING WORKSHOP
- * IHEY309 PROJECT WORK

r. Gnanapavan

28/158

Curriculum plan for 16
 36 Hours per week
 Total Hours per week
 Total Hours: 576

M.P. BOARD OF TECHNICAL EDUCATION, BHOPAL
 FINAL YEAR DIPLOMA PROGRAMME IN ELECTRONICS ENGINEERING (Y-SCHEME)
 (INDUSTRIAL ELECTRONICS)
 (To be introduced in 1996-97 at PDU beneficiary Polytechnics)
 (SIXTH SEMESTER)

S.No.	NAME OF SUBJECT	SCHEME OF STUDY				SCHEME OF EXAMINATION									
		CONTACT HRS. PER WEEK (SEMESTER)			TOTAL	SESS. MKS (PRAC. ASSESS.)				BOARD EXAMINATION					
		THEORY	LAB.			TERM WORK	LAB. WORK	I	II	THEORY PAPER	DURATION	MKS	PRAC. TICAL	DURA- TION	MKS
IEY305	POWER SUPPLY <i>1 year</i>	4(64)	3(48)	7(112)	20	20	10	10	1	3 Hrs	100	1	3 Hrs	50	
EDY/ IEY306	P.C. OPERATION *	4(64)	4(48)	8(128)	20	40	10	10	1	3 Hrs	100	1	3 Hrs	50	
EDY/ IEY307	INDUSTRIAL ORGANISATION & MANAGEMENT (I.O.M.) *	8(90)	2(32)	7(112)	20	20	10	10	1	3 Hrs	100	1	3 Hrs	50	
IEY308	REPAIR MAINTENANCE & TESTING WORKSHOP	-(-)	6(96)	6(96)	-	50	-	-	-	-	-	1	3 Hrs	50	
IEY309	PROJECT WORK	-(-)	8(128)	8(128)	-	50	-	-	-	-	-	1	4 Hrs	100	
TOTAL		13(208)	23(368)	36(576)	60	180	30	30	3	-	300	5	-	300	

NOTE: (1) No. of theory paper : 3 (7) Ratio of theory marks : 300/600 (9) Passing marks for:
 (2) Total theory marks : 300 and (Sessional+Pro. Assess., +Practical+Inplant Training marks. (a) Theory - 33%
 (3) No. of practicals : 5 (8) Total Marks : 900 (b) Practicals - 40%
 (4) Total Pract. Marks : 300 (c) Sessionals - 60%
 (5) Inplant Training Mks.: Nil (d) Inplant Training - 50%
 (6) Total Mks. of sessional : 600 & Inplant Training.

* Common for Electronics Communication and Industrial Electronics.

[Signature]
 29/6/96
 K. Chakraborty

28/1/59

Final Year Diploma in Electronics Engineering (Y-Scheme)
(Common for Electronics Communication & Industrial Electronics) *Y/S*
(Industrial Electronics)

Subject/Course : POWER SUPPLIES
Code : ~~EE~~ / IEY-305

Rationale :

Electronics equipment/gazrets have entered in daily life of human being directly and indirectly to a large extent. All the sophisticated domestic, entertainment, Communication and industrial control equipment have electronics systems for their operation or control.

All electronic-circuits need a specific power supply for their steady and reliable operation.

Power supplies is the heart of any electronic circuit/equipment feeding the life juice 'current' at required pressure 'voltage' to make the brain & body of the electronic equipment to function as desired & designed.

The knowledge of working of various types of power-supplies, their operation, maintenance and trouble shooting is of vital importance for all the electronic technicians in field of communication and industry.

The course aims to give general insight of the basic and special power supplies along with associated conditioning equipment commonly used in field of Electronics. Most vital quality of a power supply- viz. Regulation has been dealt at length and the two popular methods viz (i) Linear and (ii) Switch mode, regulation have been dealt with seperately.

K. Umbar



28/160

Final Year Diploma in Electronics Engineering (Y-Scheme)
(Common for Electronics Communication & Industrial Electronics)

Subject/Course : POWER SUPPLIES
Code : ~~ECY~~ IEY-305

Scheme of Studies

S.No.	Chapter/Topic	Theory Hrs.	Practical Hrs.	Total Hrs.
1.	Introduction	8	4	12
2.	Linearly Regulated Power Supplies.	18	14	32
3.	Switch Mode Power supplies.	10	10	20
4.	Alternative Power Supply & Source	8	4	12
5.	Line Conditioning Equipment.	10	10	20
6.	Protection	8	8	16
7.	Operation, Maintenance and Safety.	8	8	16
Total		70	58	128

Table of Specifications for assesment:

S.No.	Topic	K	C	A	Total
1.	Introduction	5	-	-	5
2.	Linearly Regulated Power Supplies.	5	13	7	25
3.	Switch Mode Power Supplies	5	5	5	15
4.	Alternative Power Supply & Source.	5	5	2	10
5.	Line conditioning equipment.	3	10	2	15
6.	Protection	3	10	2	15
7.	Operation Maintenance & Safety.	4	9	2	15
Total		28	55	20	100

K -> Knowledge C -> Comprehension A -> Application

Signature

Signature
PAGE - 2 -

28/161

Subject : Power Supplies

Code : EET/IEY-305

S.No.	Topic/Sub Topic	Intended Learning Outcome (ILO)	Remarks
1	<u>INTRODUCTION :</u>	The student will be able to:	
1.1	Types of Sources	- List the various power sources commonly used.	A.C. mains, Generator sets, Batteries, Dry cells, Electronic Power supply, Solar battery; etc. to be listed. - Definition of current and voltage source.
1.2	Ideal Power Source	- State the characteristic of an ideal power source.	- Steady, stabilised - No fluctuation - No Transients/Surges - able to meet required current at rated voltage under load condition.
1.3	Limitations of Power Source	- state the reasons for voltage drop in conventional power sources under load condition. - list the disadvantages of Batteries for high power requirement.	- concept of Internal resistance to be demonstrated in lab on different sources: Batteries, Dry cells etc. - cost, weight, volume & other criterias.
1.4	Electronic Power supplies	- Enumerate advantages of Electronic power supply over storage battery.	- By experiment in lab.
1.5	Application of Electronic Power Supplies.	- List broad specifications of power supplies (voltages, currents) for TV, VCR, Computers, Drives other common Electronics ckts., linear IC, Digital IC, TTL, CMOS ckts.	- Single & multi supply.

K. Chandra
29/6/96

28/162

REGULATED POWER SUPPLIES :

2.1 Introduction

- draw a functional block diagram of a linear regulated power supply.
- explain the function of each block.

2.2 Rectifiers:

List the types of rectification.

2.2.1 Uncontrolled Rectifiers

- explain working of H.W/F.W/Bridge rectifier ckts. using diodes.
- list devices/components used in Rectifier ckts.
- select components/devices for rectifier ckts. for specific application.

- Uncontrolled

- ----dc----

- ----dc----

2.2.2 Controlled Rectifiers:

- list the effect on transformer and device rating due to different rectifying schemes.

a) Thyristor

- explain two transistor model of thyristor.
- state the V-I characteristics.
- describe the turn on and turn off characteristic of thyristor.
- List and explain the types of thyristors.
- explain series and parallel operation of thyristors.
- describe simple firing methods.

b) Single phase controlled rectifiers

- explain the principle of controlled rectification with the help of
 - Half wave
 - Full wave
 - Bridge circuits with resistive load.
- Calculate V_{dc} , I_{dc} , V_{rms} ripple factor with the help of waveforms

- Treat resistive load only. wave forms shall be analysed to understand the principle of controlled rectifier.

Handwritten signature

Handwritten scribble

28/163

c) Three-phase controlled rectifier

- describe working principle of 3 phase halfwave & fullwave rectifier
- Calculate V_{dc} , I_{dc} , V_{rms} , ripple factor with the help of waveform.
- Compare the three phase rectifier with single phase rectifier circuit.
- Give complete scheme of rectification in 3-phase halfwave rectifier using block diagram.
- Explain working of each block.
- Treat resistive load only.
- scheme of complete ckts.

2.3 Filtering circuits

- describe the need of filter circuit.
- list the types of filters.
- explain the working characteristics and use of each types of filter.
- list the effect of filtering circuit on rating of device.
- Compare the filter circuits.
- DC and AC filters may be taught separately.
- Define idea for selection of proper filter circuit.
- Explain the other sources of ripples in practical circuit and the methods to reduce these ripples.

2.4 Regulation of dc voltage

- describe the principle of regulation using:
 - a) Simple series regulator circuit.
 - b) Simple shunt regulator circuit
- describe following basic practical circuits:
 - a) parallel with zener diode.
 - b) series circuit with PTC, NTC.
- Explain basic practical circuits using transistors and Op-amp.
- compare the two types of regulators.
- calculate the voltage regulation
- state the power supply with regulating circuit as fixed and variable voltage.
- state the advantage of current rating in a power supply.
- Give the scheme of practical circuit for voltage and current setting.
- Lab work
- Lab work (Approach may be either integrated or in separate blocks)

K. Chandra

(Signature)

28/164

1.5 IC's Regulators

- Select a fixed voltage IC's regulator for:
 - a) +5V and -5V
 - b) +8V and -8V
 - c) +12V, -12V
 - d) +15V, -15V
 - e) +24V, -24V
 - f) 30V
- state the internal detail of these IC's with current rating and mounting.
- Give the circuit diagram using IC's and test it for voltage regulation and ripple reduction.
 - Lab work
 - suggest current protection.
- Select a variable voltage IC's regulator for
 - a) 0 - 15V
 - b) 0 - 30V
- Give a circuit diagram using IC's and test it for voltage regulation and ripple reduction.
 - Lab work.

2 Introduction of switching regulators

Understand the need of switching regulators and its basic principle of working.
Demonstration and experiments on coil behaviour with switch.

- 3.1 Limitation of linear regulators in terms of
 - transformer loss
 - Power efficiency
 - Power transistor loss

- Define Power efficiency.
- state the limitations of linear regulators.

- 3.2 Behaviour of coil during on and off of switching transistor (switch)

- Describe the coil behaviour in switching circuits.

- 3.3 DC to DC power converters

Understand the principle, classification and use of DC to DC converters.
- Explain the need of DC to DC conversion in regulators.

- Some practical circuits may be demonstrated.

- 3.3.1 Principle of Pulse width modulation.

- Describe the Pulse width modulation principle.

Handwritten signature and scribbles.

28/165

- 3.3.2 Dc to Dc Converter configuration - Draw and explain different configurations of DC to DC converter.
 - Boost
 - buck
 - buck-boost
- 3.4 Blocking Regulators
 - 3.4.1 Block diagram
 - Draw the block diagram of blocking regulators.
 - write the function of each block.
 - 3.4.2 Principle of Blocking Oscillator
 - Explain the working of blocking oscillator.
 - 3.4.3 Operation of Switched mode blocking oscillator
 - Describe operation of Switched Mode Power blocking oscillator
 - 3.4.4 Signals/waveshapes of blocking oscillators
 - Draw & describe output waveform of blocking oscillator.
 - 3.4.5 Blocking Regulator behaviour at
 - Input voltage variation
 - load variation
 - Explain the behaviour of blocking regulator with variation in input voltage and load.
 - Explain the principle, characteristics and use of blocking regulators in SMPS.
 - Draw the waveshapes at various test points of blocking regulator.
 - basic troubleshooting exercises of SMPS ckts.
 - Omega
 - DMS
 - SPL TV
 - others available.

4. Alternative Power Supply & Source.

- 4.1 Un-interrupted power supply
 - Effect of supply interruption
 - State the effect of supply interruption in Computers/Computer controlled system.
 - Assert importance of UPS
 - Importance of maintaining interruption free supply in Computers.
 - Names of such systems to be enumerated.
 - Data loss, Productivity loss, Process loss, system loss. Additional cost justified.
 - UPS. Bloc Diagram
 - Draw block-diagram & explain function of each block.

28/11EV 300
 28/6/96
 [Signature]

28/166

- Working of each block with circuit.
- On-line UPS
- OFF-line UPS
- Operating controls & indications on Panel
- Battery maintenance

- Explain working of OFF Line UPS
- Explain working of ON Line UPS.
- Identify specifications of UPS as per requirement.
- Lab Exercise.
- Explain importance of Battery Maintenance in UPS.
- Carry out suggested preventive maintenance and prepare documentation

- Difference in working & cost between On-line & Off-line UPS.
- Lab Exercise.
- Specifications of UPS
- Lab Exercise.

4.2 Solar Batteries?

- List the specification of single P.V.cell.
- Arrange combination of PV cells for a required voltage & current of the application ckt.
- Identify the storage battery specifications
- Assemble and install inverter ckt.
- List the sources & agencies for procurement of solar batteries/systems.
- Install available Solar powered systems and maintain them.

- Voltage & current rating
- Study on available Solar systems:
 - 1) Street light
 - 2) Pump motor
 - 3) Rural TV sets.
 - 4) Rural Exchangees

3 AC line conditioning equipment

5.1 Need for line conditioning

- List the draw back of AC mains. (commercially available)
- State the effects of voltage fluctuations on Electronic circuits.
- state the effects of surges/transients in AC, on special Electronics ckts. (Computers, Digital Communication, Fax, etc.

5.2 Conditioning against supply voltage variations (Step correction)

- Draw block diagram of a simple commercial solid state voltage stabilizer (Buck & Boost)
- Explain working of solid state voltage stabilizer circuit (Buck & Boost) Auto cutoff.
- Test the operational range of the given stabilizer.

- Demonstration in class room.
- Lab experiment

K. Lakshmi
2/1/16



28/1/67

5.3 Conditioning against Supply variations (Continuous correction)

- draw backs of solid state stabilizer
- state applications of solid state voltage stabilizer.
- state the need of periodical maintenance of relays.
- State the disadvantages of step correction method.
- state need of continuous correction of supply voltage.
- Draw the block diagram of Servo-controlled voltage stabilizer.
- Auto Transformer, voltage regulating transformer, Servo-motor and control circuit, Protection ckt. Manual control circuit.
- Explain the function of various blocks.
- Explain working of circuits of various blocks.
- Explain the working of protection for over voltage, current and limiting switch.
- State the functions of various controls and indicator on the pannel.
- State the specification of Servo voltage stabilizer.
- Rate of correction, voltage regulation power rating.
- study of circuit in laboratory and factors affecting voltage regulation and correcting rate.
- State the need for periodical maintenance of carbon brush and relay used in servo control voltage stabilizer.

5.4 C.V.T.:

- Describe the working principle of CVT with diagram.
- State the various block of CVT.
- Cost, waveshape, efficiency, Heating.

K. Srinivas



28/168

3.5 Spike buster

- State the working of various blocks.
- State the advantages and disadvantages of CVT.
- State the specification for selection of CVT.
- State reasons for transients voltage at the A.C. input.
- state the harmful effect of the voltage spike.
- state the working principle of spike buster.
- Study and Experiment testing in lab.
- Cost, efficiency, Heating of Transformer, wave shape, output.
- study & testing in lab observing input output wave shapes.
- study in lab on actual circuit.

4 Protection

6.1 Limiting conditions leading to fault.

- State the cause of failure of device and component.
- Assess the reasons for heating of devices and component
- 1) Power loss due to working under unsaturated condition of devices.
- 2) Power loss due to over current.
- Identify the reasons for voltage stress and its causes:
 - 1) over voltage
 - 2) Transient voltage within the circuit and out side the circuit. ($di/dt, dv/dt$)
- Describe the effect of over heating and voltage stress on component/device.
- Switching losses.
- I R loss.

6.2 Protection of devices against over heating due to switching loss.

- Assess the power loss in devices on the basis of voltage drop and current
- state the reasons for failure due to heat loss.
- state the reasons for using a heat sink to reduce a temperature rise.
- Dissipation factors are to be discussed.
- Methods used to increase dissipations.

Z. Gupta

28/169

6.3 Protection against over heating due to over current for devices and the circuits.

- state the factor resulting in cooling by use of heat sink.
 - state reasons for mounting of heat sink at different locations.
 - Mount a device on a heat sink.
 - state the protective scheme adopted for over current in devices.
 - state the protective scheme used for the power supply.
 - Explain graphically protective scheme for current limiting and foldbacking and compare the two schemes.
 - Describe the current limiting scheme for:
 - i) Transistorised circuit.
 - ii) Thyristorised circuit.
 - Describe crowbar protection used for thyristorised device and state its advantage over the other protective schemes.
 - Describe the use of H.R.C. fuse as second line of defence.
- Effect of increasing cooling fins.
 - Thermal conductivity and surface area.
 - Lab-work.
 - Fuse, current limiting Foldbacking.
 - Lab work through actual circuit.
 - ---do---

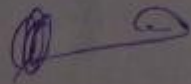
6.4 Protection of devices and the circuit against voltage stress.

- Describe the protection of device for transient voltage by Snubber circuit.
 - state the reasons for connecting a resistance with the suppressing capacitor.
 - Describe the method of protection of device from circulating current.
 - Describe the over voltage protection using crowbar for thyristorised ckt.
- Lab work through ckt.

6.5 Safety against shock

- Justify the need for isolation of output of a power supply from mains.
- Describe the working of an isolation transformer.
- State the advantage of isolation transformer.
- State the criteria for selection of rating of an isolation transformer.

K. Chitra



28/170

7 Operation- Maintenance of Power Supply, Safety & Productivity.

- 7.1 Selection of Power Supplies for specific application.
 - Assess the current & voltage requirement of the circuit.
 - Assess the current & voltage ratings of the available Power Supply.
 - Select appropriate Power Supply for the circuit from available Power Supply.

Voltage & current rating of Power Supply for given circuit requirement.

- 7.2 Operation of Power Supply
 - Name & identify the various operating switches & controls on the front panel of Power Supply
 - locate protective fuses in the Power supply.
 - Select proper fuses and replace if required.
 - Use the available Power Supply within permissible range of Power supply.
 - list the precautions during operating Power supply.

ON-OFF switches voltage, current control meters, indicators on the panel, input & output terminals, polarity and ground.
Proper mains input & output voltage & current.

- 7.3 Maintenance
 - 7.3.1 Installation & preventive maintenance.
 - Check insulation of power supply with earth & body of power supply at
 - i) Initial installation of power supply.
 - ii) periodical checking
 - iii) after long storage time interval

Actual practice in lab with the power supply and instruction & maintenance manuals.
 - 7.3.2 Inspection
 - Open & check the internal parts for breakage, cracks, dust worn-out parts, loose contacts, loose heat sink etc.
 - 7.3.3 Minor Maintenance
 - Clean & replace parts where ever required.

- Lab practice.

K. Gupta

28/171

7.3.4 Inventory

- list inventory parts, and parts prone to damage for replacement and material & tools for maintenance.
- Select & use proper size & shaped tool for maintenance work.

- Lab Practice.

7.4 Trouble-shooting

7.4.1 Fault finding & Repairing

- Locate components on PCB from ckt. diagram.
- List and identify test & measuring points on ckt. board from circuit diagram.
- Test & measure voltages & wave shapes at test points.
- Identify, locate faulty section/component.
- Replace faulty section/component.

- Lab practice, Demonstration, fault simulation of faulty power supply.

7.4.2 Documentation

- Prepare & maintain documentation of maintenance.

- Main schedules, History cards & other documents forms/ programs to be filled

7.5. Productivity:
Proper selection, proper operation, proper up-keep. Reduce down time of equipment/ machine. Improve productivity indirectly.

- Explain the method for improvement of productivity/Utilization of electronic equipment/Electronically controlled machines.

- General discussion & analysis of faults in equipment and machines in production. (Faulty Power Supply or circuit faults due to wrong/malfunctioning of power supply.

[Handwritten signature]

28/172

7.6 Environment Protection and Energy conservation.

7.6.1 Environment Protection during Battery charging/discharging (gases avoided in Electrical regulated power supplies)

- Explain the method for environment protection by use of Electronic Power supplies.

- Harmful gas of lead-acid & Nickel Ferrous battery avoided by elimination of use of these batteries or keep them away from work-site if inevitable.

7.6.2 Energy Conservation:

1) S.M.P.S. method reduces losses & heating to increase efficiency and save energy.

- Explain the method for saving of energy by using switch mode power supplies in place of linearly regulated power supplies.

- Higher efficiency by use of PWM technique

2) Large generating equipment like UPS, CVT, Isolation transformer to be kept outside the temperature controlled work site.


- Explain the method for saving of electrical energy for cooling a work site proper placement of equipment.

Handwritten signature and scribble

28/173

Suggested list of Experiments :

- 1) V.I. Characteristic of Batteries; cells, AC mains & Electronic Power Supplies by loading them.
- 2) Study of Power supplies, (their V,I requirement) for TV, VCR, Communication Equipment, Fax, Photo copier, Computer and other equipment.
- 3) Study the operation of an SCR connected as a gate controlled ac rectifier.
- 4) Observe the waveforms and determine the output d.c voltage of thyristorized rectifier with 'R' load.
- 5) Study the characteristics of an electronic d.c. voltage regulated power supply with the help of simple practical circuits.
- 6) Identify the components for
 - Zener voltage regulator
 - Transistor regulator
- 7) Observe the effect of input voltage variation and load variation on regulator output voltage using simple practical circuit.
- 8) Identify and prepare inventory of the components used in available commercial power supply.
- 9) Measure & test the voltage at various test points of a commercial power supply.
- 10) Fabricate simple practical circuits of power supplies using 3 pin IC regulator.
- 11) Prepare the various configurations of DC to DC converters buck, boost and buck-boost.
- 12) Display various waveshapes and measure voltages at various stages of practical SMPS circuits like;
 - SMPS used in TV/VCRs.
- 13) Prepare the blocking regulator using discrete component trainers.
 - draw the waveshapes at various points.
 - measure the DC/AC voltages at various points.
- 14) Study the working of UPS.
- 15) Study the battery maintenance procedure.
- 16) Study solar battery operated system like, Street light, pump motor rural exchange.
- 17) Testing of operational range of a solid state stabilizer to determine
 - Lower cut off, Upper cut off
 - Bucking & step boosting step, with respect to in-put & output voltages.

K. Condy 

28/174

- 18) Observe wave shapes of switching surges in the solid state stabilizer on CRO.
- 19) Test the cut-off points, and rate of correction in servo-controlled stabilizer.
- 20) Observe wave-shape of switching surges in servo-control stabilizer on CRO.
- 21) Observe behaviour of CVT with variable AC input at No-load and On-load observe wave-shape of CVT out-put.
- 22) Observe wave-shape of input & out-put of a spike buster Connected to output of
 - (1) solid-state stabilizer
 - (2) servo control stabilizer.
- 23) Practice of mounting devices as Heat sink (mica-silicon grease to be used)
- 24) Assemble current limiting ckt. and observe load current/ Voltage characteristics. (for Fold backing ckt., Crow-bar ckt.)
- 25) Observe output wave-shape of an isolation Transformer with switching surge on input side.
- 26) Test Insulation resistor of a Power supplies assembly with respect to earth/body with help of insulation tester.
- 27) Carry out inspection & minor maintenance on
 - 1) Regulated D.C. Power Supplies
 - 2) Solid state AC voltage stabilizer.
 - 3) Servo control voltage stabilizer.
- 28) Test & measure voltage/wave-shapes at various test points & compare with instruction / maintenance manual data.
- 31) Locate faults in a faculty Power supply (On- Fault simulated Power supply) and repair it and prepare maintenance documents.

Note : At least 70% of the suggested experiments should be conducted covering all the topics specially maintenance type of experiment.

[Handwritten signature]

28/175

Suggested list of References/ Books:

S.No.	Author	Title	Publisher
1.	M.H.Rashid	Power Electronics	P.H.I.
2.	Cyril.W.Lander	Power Electronics	M.G.H
3.	Z.bar	Industrial Electronics A Text Lab Manual	T.M.H
4.	Schilling Belove	Electronics circuits	Mc GRAW HILL.
5.	DEGEM Educational Electronic Systems	Course-H Electronic Sources (Power Supply)	DEGEM Power Electronics Ltd.
6.		Literature on non conventional energy sources.	Available with Urja Vikas Nigam.

[Handwritten signature]

[Handwritten mark]

28/176

Final Year Diploma in Electronics Engineering (Y-Scheme)
(COMMON FOR COMMUNICATION AND INDUSTRIAL ELECTRONICS)

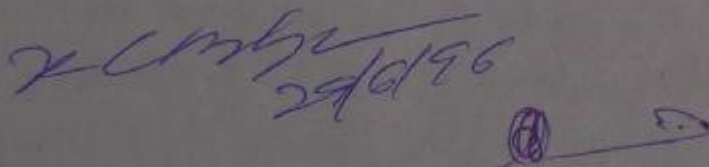
Subject/Course : PC-OPERATION
Code : ECY/IEY-306

Rationale :

As Computer is big-boom of the modern era, and very much in everyday activities on every level. It has its own importance in Office Management Systems, Industrial Production System as well as in Home applications. Therefore it is very essential that every individual must be a **Computer literate** and able to operate computer for his own needfulness.

Since the electronics is very much involved with manufacturing as well as software development of Computers, the society expects that the Electronics Diploma Holders must have adequate knowledge and skills in **Computer-Hardware as and Software**. Keeping this matter of fact in mind, a subject in the Electronics Engg. Course-ware of 'Y-Scheme', for the computer awareness "**PC-OPERATION**" is being introduced for the students of the Electronics stream to fulfil the expectation of the society and the industries.

In this courseware it has been taken care of that the students must be having a good knowledge of the internals of the computers, its specifications, peripherals, compatibility and the Application Softwares in use.

Handwritten signature and date:
28/176
29/1/96


28/177

Final Year Diploma in Electronics Engineering (Y-Scheme)
(Common for Electronics Communication and Industrial Electronics)

Subject/Course : PC-OPERATION
Code : ECV/IEY-306

Scheme of Studies :

S.No.	Chapter/Topic	Theory	Practical	Total
1	Introduction to micro-computer/pc	06	04	10
2	Internal organization of microcomputer	08	04	12
3	Input, output and peripheral devices	12	09	21
4	Operating system	10	20	30
5	Database & application software	25	30	55
Total		64	64	128

Table of specification for assessment :

S.No.	Topic / Chapter	K	C	A	Total
1.	Introduction to microcomputer / pc	05	-	-	05
2.	Internal organization of micro-computer	05	12	03	20
3.	Input, output and peripheral devices	05	10	05	20
4.	Operating systems	06	10	06	22
5.	Database & application software	08	10	15	33
Total		29	42	29	100

Note : K --> Knowledge Level.
C --> Comprehension Level.
A --> Application Level.

ECV/IEY 306

[Handwritten signature]
29/6/20

[Handwritten signature]

28/178

Subject : P.C. Operation

Code: IEY-306

S.No.	Topic/Sub Topic	Intended Learning Outcome (ILO) (Objective)	Remark
1	<u>Introduction to microcomputer and PC.</u>	Students WILL be able to understand the functioning concept of Microcomputer/PC.	
1.1	The evaluation of Micro-computers.	* Give the historical background in the development of Microcomputers.	
1.2	Block Diagram	* Draw block diagram of a Microcomputer/PC. - Explain functionality of each block.	
1.3	Generation and Classification	* Describe the generation of Computers. - Describe the classification of Micro-computers.	
1.4	Data Information	* Define data and information. - Distinguish the difference between data and informations.	
1.5	Software & Hardware	* State the concept of software and Hardware. - Define the Microcomputer Hardware. - Enumerate the various Hardware parts of a Microcomputer. - Define the Computer software and give examples.	
1.6	Types of Software	* Explain various types of softwares. - List out the various software for each type.	* Application, Utility and system software.
1.7	Virus and Vaccines	* Define the virus in computers - List-out various types of viruses and its effects. - List out various vaccines available. - Explain the concept of diagnostic software and its utility with examples.	* Demonstrate virus effect on a computer/ File. - Remove virus and again show Computer/ File after cleaning. - Cleaning procedures. - Booting computer (infected) and its precautionary.

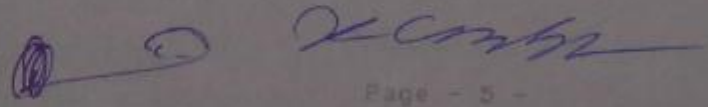
K. Srinivas

28/179

- 1.8 Generation of Languages/Packages
- * Define Computer Language
 - Draw computer language/package hierarchy.
 - Define Low-level language
 - Distinguish among Assembler, Compiler and Interpreter.
 - Clearly distinguish High-level language from low level language.
- * Demonstrate some examples of languages and software (Packages)
- 1.9 IBM-PC Compatibility
- * Describe the basic features of a IBM-PC1
 - Enlist various advantageous features of IBM-PC.
 - List out basic criteria for IBM-PC compatibility (i.e. IBM-Intel processors, DOS operating systems)
- * Demonstrate PC with Processors of AMD, Cyrix, Texas Processors (80286, 386, 486, instead of 1286, 386, 486) (If possible)
- 2 International organisation of microcomputer.
- 2.1 Microcomputer/PC Board lay-out.
- * Draw PC-System board lay-out.
 - Explain each block and its functionality.
- * Demonstrate the mother board of PC/PC-XT/PC-AT of different manufacturer.
- 2.2.0 PC Memory
- * Describe various types of PC-Memory present with PC/Microcomputers.
- * RAM/ROM/HDD cache (internal/external) etc.
- 2.2.1 - Conventional RAM
- * Explain various types of RAM used in PC/ Microcomputers.
- Demonstrate how RAM of a system is extended on motherboard.
- 2.2.2 - Upper Memory Area (UMB)
- Distinguish the conventional RAM ,
- 2.2.3 - Extended RAM (XMS)
- Extended RAM, Expanded RAM, Upper
- 2.2.4 - Expanded RAM (EMS)
- Memory block (UMB), Video RAM.
- 2.2.5 - VRAM (Video RAM)
- Explain utilities of XMS and EMS.
- 2.2.6 - BIOS ROM
- * Explain BIOS-ROM and its utility in PC/ Microcomputer.
- Show the cache of a system on Mother board

28/130

- 2.2.7 - Cache
 - Explain cache, its utility and advantage.
 - Distinguish between Internal Cache and External cache.
- 2.2.8 PC-Memory Allocation
 - * Draw PC Memory allocation table, showing the different areas of Memory Allocation i.e. BIOS Area, User Memory Area, Video memory area, Command com area etc.
 - * Draw Memory table and show location of each area.
- 2.3 Maths Co-processor.
 - * Explain the function of Maths Co-processor and its utility.
 - Enumerate the various co-processors available for various Micro-computer/ PC-systems.
 - * Demonstrate, the Math Co-processor on board. And also demonstrate how to put it in its slot.
- 2.5 Bus Architecture Technology
 - * Explain various types of Bus Architecture technology used in Micro-computer/ PC i.e. ISA, EISA, PCI and VL-Bus.
 - Enumerate the advantage of various Bus architecture systems.
 - * Show/ demonstrate various architecture Bus in the computer and its features (if possible)
- 2.4.0 PC-Expansion systems
 - * Describe the standard expansion bus system within the PC/Microcomputer.
 - Explain the means of connecting essential peripheral hardware through controller cards in a PC/Micro-computer.
- 2.4.1 PC-Expansion Bus.
 - Explain primary and secondary expansion bus.
 - * Show/demonstrate the 62-way and 36-way
- 2.4.2 PC-Expansion Cards
 - List out various expansion card format i.e. short card, Half size card, standard 8-bit card, 16-bit cards etc.
 - Expansion-Bus, various types of Expansion cards, or plug in cards.
- 2.4.3 PC-Expansion Bus connector
 - Explain the direct edge type expansion bus connector (62-way and 36-way).
 - Explain power rail connectors and show on computer.



23/181

2.6 Communication Ports

- * Describe communication ports available in PC/ Microcomputers and its utility.
- Enlist various communication ports and functions i.e. serial ports, Parallel ports, LPT.
- List common serial/parallel interface connector (i.e. RS-232/RS-232-C etc.)
- Explain communication between PCs through serial ports using VTERM/XTALK.
- * Identify the ports and its connectors 9-pin D-connector, 25-pin connector, Edge-type connector etc. and demonstrate.

2.7 PC/Microcomputer specification

- * Write typical specification of PC/ Microcomputer and interpret each specification term.
- Select best suited PC/Microcomputer for specific use.
- * Demonstrate a typical system specification verification.

3 I/O and Peripheral devices

- * Explain the need of other I/O and peripheral device to run a micro-computer/PC.
- Enlist various bare-minimum I/O and peripheral devices i.e. Monitor, key board etc.
- * Demonstrate various type of I/O and peripheral device on a PC. (if possible)

3.1.0 Video Display Unit (Monitor)

- * Enlist various Video mode (Graphics) related to computers.
- Select video display for specific computer.
- * Show various type of Graphic adapter cards and Monitor (Monochrome and colour) and its graphic capabilities. (if possible)

3.1.1 Video Display Adaptors

- CGA
- MCGA
- EGA
- HGA
- VGA
- SVGA

- Enlist the advantages of color monitor over Monochrome monitor.
- * List out various graphics adapter mode of video used for PC/Micro-computer.
- * List out the features of various Graphic Adapter.

3.2.0 Input devices

- * Define Input device and its necessity for a computer.
- List out various input device, most commonly being used. (i.e. keyboard, Mouse, Track-Ball, Joy-stick, Light-pen Digitizer, Scanner etc.)
- * Demonstrate various input devices available and its use as input device.

28/182

3.2.1 Key board

- * Define function of a key board
- enlist various types of key board commercially available. (i.e. 83-key, 101-key, Enhanced 101-key, Ergonomic key board ect.)
- List out various types of keys available on a keyboard and explain each.
- Explain the difference between Type-writer keyboard and computer keyboard

- * Demonstrate 83-key, 101-key, Enhanced 101-key, Ergonomic key-board.

3.2.2 Mouse/Trackball

- * Define function of a Mouse/Track ball
- Explain the installation of a Mouse/Track-ball.
- List out features of a Mouse.
- Compare Mouse with Track-ball with its features.

- * Demonstrate Mouse/Track-ball and its functioning.
- Demonstrate, how to install, loading its drives.

3.2.3 Other Input devices

- * Enlist various input devices apart from key-board and Mouse.
- Enlist various features of all other input devices and specific uses.

- * Demonstrate all other input devices, i.e. scanner, Digitizer, Joy-stick, Template, Light pen etc. (as per availability)

3.3.0 Output Devices

- * Define the function of output device and its necessity.
- Enlist various output devices commonly used.
- Explain the various specific application for each devices.

- * Demonstrate various printers Plotters and its function.

3.3.1 Printers

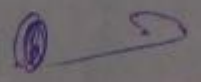
- * Enlist various types of printers. (i.e. DMP, Line-Printer, Inkjet, Bubble-Jet laser)
- Define Impact and Non Impact Printers
- Explain various features of each category printers.
- List out the various application.

- * Demonstrate output of each printer and show for comparison.

3.3.2 Plotters

- * define Plotter and its necessity for specific use.
- List out various type of Plotters
- explain the features of plotters.

- * Demonstrate the operation of a plotter and compares its output with printer output.



28/183

3.4.0 Peripheral devices

3.4.1 Storage Device

- * Define the peripheral devices and its utility.
- Enlist various peripheral devices commonly used.
- * Explain the need of storage device for a computer.
- List out various storage devices and explain (i.e. Floppy Disk, Hard Disk, CD-ROM Disk, Tape etc.)
- Distinguish the difference between Hard-Disk and Floppy Disk.
- Explain the concept of serial and Direct Accessing of data/information.
- * Demonstrate various peripheral devices and its utility.
- * Show the various storage devices and demonstrate how to connect with the system.
- Show the FDD of 5.25" and 3.5" and its Floppies and use.
- Demonstrate storage in FD and HD.
- Show CD-ROM Disk and reading from it (if available)

4. Operating systems

4.1 Concept of operating systems

- * Define the operating system and its necessity for a PC/Microcomputer.
- * Explain the concept of operating system in a Microcomputer.
- Justify the necessity of OS.
- * Demonstration various operating system on line (if possible).

4.2.0 Various operating systems

- * List out various operating systems commonly in use. (i.e. DOS, OS/2, UNIX, WINDOW-95 etc.)
- Enlist various advantageous features of each operating systems.
- Explain single-user/Multi-user concept in operating systems.
- List out advantages of single user as well Multi-user systems.
- Define the concept of user-Friendly environment for a computer.
- Demonstrate single user/Multi-user environment (if possible)

4.2.1 Disk operating system (DOS)

- * Enlist various types of command in DOS (i.e. Internal, External, Interrupt commands)
- Explain the concept of FILE and DIRECTORY.
- * Demonstrate the installation of MSDOS system on computer and configure it.

[Handwritten signature]
Page - 8 -

23/134

- List out various File extension and explain. (i.e. EXEC-Files, COM-Files, SYS-Files, BATCH Files etc.)
- Installation of MS-DOS.
- List out various Internal COMMANDS and Explain each with syntax. (i.e. FORMAT, BACKUP, XCOPY, RECOVER etc.)
- Define Interrupt COMMANDS and Explain (i.e. *C, *P etc.)
- Operate various COMMANDS.
- Show various Files with different extension using DIR, COMMANDS.

4.2.2 Boot-up Sequence

- * Explain Boot-up sequence.
- Modify CONFIG.SYS and AUTOEXEC.BAT Files as per application and working environment. (or create it)
- Configure PC/Microcomputer with Extended, Expanded and Upper memory area. (i.e. High Memory area loading)
- * Create new config.sys and Autoexec.Bat File and run the systems and show its effect.
- Demonstrate the method of using Himmem Sys and Upper Memory area configurations. (use of MEMM MAKER)

4.3.0 Networking

- * Explain the concept of Networking and its utility and environment.
- List out various networking systems (i.e. LAN, MAN, WAN and Ethernet, Token-Ring, Peer to Peer, Remote or Sattelite networking etc.)
- List out various networking software available.
- * Explain various Net-working systems and give brief introduction to each including Thick/Thin Ethernet.

5. Database & application software.

5.1.0 Wordprocessing (Documentation software)

- * Explain database concept and various application software and utility.
- * Explain the concept of wordprocessing or documentation software.
- List out various documentation S/W available (i.e. WORDSTAR, WORD-PERFECT, MS-WORD, LOTUS-WORD etc.)
- Enlist various features of WORDSTAR/WORD-PERFECT.
- * Demonstrate the installation of WORDSTAR or WORDPERFECT and configuration.
- Use of Internal Macros and Hot-keys.
- Show Printer configuration and Printing

28/185

- Enlist various Hot-keys and Macros of above softwara and explain.
- Install above S/W and configure according to system configuration.
- Use above S/W.
- Print documents.

5.2.1 Database

- * Explain database system and its needfulness.
- List out various types of database and its practical use.

5.2.2 Database Software

- * List out various database software available. (i.e. dBASE, FOXBASE, LOTUS etc.)
- Describe various functionality of database Software or Packages.
- Explain various features of above Packages.

- * Demonstrate th use of dBASE/FOXBASE using Menu.
- Demonstrate the writing of simple program and run it.
- Print labels, Report etc.

5.2.3 dBase/Foxbase

- * Enlist various command syntax of dBASE/FOX-BASE and Hot keys.
- Explain the use of these commands.
- Write simple programme in dBASE/ FOXBASE and run it.
- Print out report on dBASE/FOXBASE.

5.2.4 Lotus

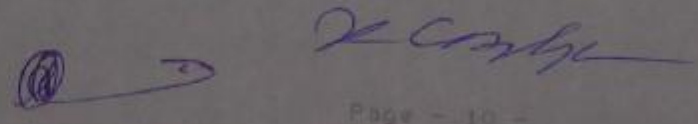
- * Enlist various command and Hot-keys for LOTUS and explain.
- Prepare database in LOTUS and Print-out reports and graphs.

- * Demonstrate installation of LOTUS and configuration of systems.
- Demonstrate the printing and Group printing using LOTUS.

5.2.5 DBMS and RDBMS

- * Explain the concept of RDBMS
- Distinguish the advantages of RDBMS over DBMS.
- Enlist various RDBMS Packages. (i.e. ORACLE, INGRES, INFORMIX, SYBASE etc.)

- * Demonstrate RDBMS S/W on any practical site or demo. (if possible)



28/186

3.3 Technical Utility Softwares

- * Explain the need of Technical Utility S/W.
- * Demonstrate the various S/W on the system and show the use. (i.e. Circuit Maker/ EWB/Cad-Star/Auto-CAD etc)
- List various technical utility S/W and uses (i.e. Circuit Maker, Electronic Bench, Cad-Star, AutoCAD etc.)
- Show the installation of any of the above software and run it.
- Install Technical software onto the system and configure it.
- Use the Software and get output on Printer/Plotter etc.

3.4 Antivirus Software

- * Explain the needfulness of Antivirus Software.
- * Show the scanning process for viruses in the system and cleaning using various Antivirus tools/Softwares.
- Enlist the various Antivirus S/W commonly used and popularly used. (i.e. Dr. Solomon, NAV, Nishot, CPAV, IAVT, Red alert etc.)
- Antivirus tools/Softwares.
- Use the scanner for detection of viruses in the system and clean it.
- Use inbuilt virus scanner/clean in MS-DOS 6.0 or higher version.
- * Use MSAV.

3.5 WINDOWS

- * Concept of WINDOWS environment.
- * Demonstrate WINDOWS installation and use.
- List out various advantageous features of WINDOWS environment.
- Switching from WINDOWS to DOS or vice-versa.
- Work in WINDOWS environments and close applications.

3.6 D.T.P. & MULTIMEDIA

- * Explain D.T.P., Multimedia and their uses in brief.
- * Show the demo on DTP and Multimedia Presentation.
- Explain latest development in DTP and Multimedia Environment.
- give idea of entire page maker coral draw for DTP.
- Enlist various S/W for DTP and Multimedia.
- give idea about sound blastics & presentation graphics software.

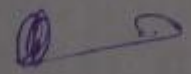
[Handwritten signature]

28/187

Suggested list of experiments :

1. Study Various Input, Output & Storage Devices.
2. Study the cables and connections of various I/O Devices and Peripheral Devices .
3. Study the functioning of Keyboard / Mouse, Monitor, Printer.
4. Study the internal parts/devices and its interconnections from on to Motherboard.
5. Practice COMMANDS of DOS :-
(a) Internal Commands. (b) External Commands. (c) Interrupt Command.
6. Practice for ROM-BIOS SET-UP of the computer.
7. Practice to Create & Modify CONFIG.SYS and AUTOEXEC.BAT Files and its effect on Booting-up.
8. Practice for Upper Memory Area configuration and HIMEM.SYS Configuration of a computer. Find out the change in internal RAM allocation available for user (using MEM).
9. Connect two PCs through Serial Ports using VTERM and Xtalk etc.
10. Study various type of VIRUSES and its effect on computer, its Scanning with the Scanner-Software and removing viruses using VACCINES.
11. Practice on File & Directory Maintenance on HD / FD. Defragmentation using DEFRAG and File / Disk-Repairing using CHKDSK, SCANDISK.
12. Practice on WordStar / WordPerfect :-
(a) Creation of a File. (b) Editing a File.
(c) Printing a File. (d) Mailmerging.
(e) Dot Commands & Internal Macros. (f) Configuration WordStar, Printer etc.
13. Practice various COMMANDS of File-Management Programming.
14. Practice on dBase-III / IV / V or FoxBase :-
(a) Create Database. (b) Import / Export Database.
(c) Label Printing. (d) Database Printing with Arguments.
(e) Report Writing/Printing. (f) Dot COMMANDS.
(g) Simple Programming and Execution.
15. Practice on LOTUS 1-2-3 :-
(a) Prepare Spreadsheet. (b) Printing.
(c) Configuration for Spreadsheet. (d) Configuration for LOTUS-Graph.
(e) Printing Graph.
16. Practice on WINDOWS Environment, and Configuration of WINDOWS.
17. Prepare different types of Electronics Circuits using CadStar / EWS / AutoSketch / Circuit Maker or any other.
18. Prepare PCB Lay-out / Drafting using CircuitMaker / CadStar / Autosketch or any other.
19. Study any D.T.P. Software and use it.
20. Study any Multimedia / Animation Software and use it.
21. Study various types of common operation fault diagnosis.

[Handwritten Signature]



20/10/20

Department List of References/Books

1. The Great Wall of China and the Great Wall of the World
by John Fairbank
London: Collins, 1987
2. The Great Wall of China
by John Fairbank
London: Collins, 1987
3. The Great Wall of China
by John Fairbank
London: Collins, 1987
4. The Great Wall of China
by John Fairbank
London: Collins, 1987
5. The Great Wall of China
by John Fairbank
London: Collins, 1987
6. The Great Wall of China
by John Fairbank
London: Collins, 1987
7. The Great Wall of China
by John Fairbank
London: Collins, 1987
8. The Great Wall of China
by John Fairbank
London: Collins, 1987
9. The Great Wall of China
by John Fairbank
London: Collins, 1987
10. The Great Wall of China
by John Fairbank
London: Collins, 1987
11. The Great Wall of China
by John Fairbank
London: Collins, 1987
12. The Great Wall of China
by John Fairbank
London: Collins, 1987

10

[Handwritten signature]

28/189

Final Year Diploma in Electronics Engineering (Y-Scheme)
(Common for Electronics Communication and Industrial Electronics)

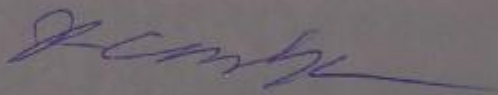
Subject/Course : INDUSTRIAL ORGANISATION AND MANAGEMENT (I.O.M.)
Code : ECY/IEY - 307

Rationale

The optimum operation of any industrial organization demands its staff to share the administrative and technical responsibilities efficiently and effectively. The great technological and sociological advances that have occurred in all segments of our society have forced the developments of new management concepts, techniques and tools to cope up with complexity of growth and change. To meet the challenges of complexity, the systematic and organized approach in every discipline is indispensable in a society which is producing more technically qualified persons, newer materials and complex products and more information than ever before.

Keeping in view of the competencies identified during discussions with a group of industrialists and academicians the following new topics have been added, apart from the conventional topics normally taught in management such as Management of Human resource, Production, Materials, value Engineering etc. New areas incorporated are Productivity, Total Quality Management (various approaches Philip Crosby, Deming, Juran, Taguchi, Kaizan etc.), Just-in-time concepts, Ishikawa diagram, SWOT analysis, Logic structures and Communication Skills etc.

Apart from this keeping in view of the importance and necessity, the basic concepts of work study, Maintenance and safety have been included. Due thought has been given to keep in line with the national emphasis on environment and pollution control.





28/189

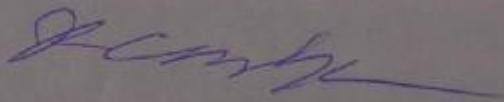
Final Year Diploma in Electronics Engineering (Y-Scheme)
(Common for Electronics Communication and Industrial Electronics)

Subject/Course : INDUSTRIAL ORGANISATION AND MANAGEMENT (I.O.M.)
Code : ECY/IEY - 307

Rationale

The optimum operation of any industrial organization demands its staff to share the administrative and technical responsibilities efficiently and effectively. The great technological and sociological advances that have occurred in all segments of our society have forced the developments of new management concepts, techniques and tools to cope up with complexity of growth and change. To meet the challenges of complexity, the systematic and organized approach in every discipline is indispensable in a society which is producing more technically qualified persons, newer materials and complex products and more information than ever before.

Keeping in view of the competencies identified during discussions with a group of industrialists and academicians the following new topics have been added, apart from the conventional topics normally taught in management such as Management of Human resource, Production, Materials, value Engineering etc. New areas incorporated are Productivity, Total Quality Management (various approaches Philip Crosby, Deming, Juran, Taguchi, Kaizen etc.); Just-in-time concepts, Ishikawa diagram, SWOT analysis, Logic structures and Communication Skills etc. Apart from this keeping in view of the importance and necessity, the basic concepts of work study, Maintenance and safety have been included. Due thought has been given to keep in line with the national emphasis on environment and pollution control.



28/191

Subject: Industrial Organisation & Management.

Code : ECY/IEY-307

S.No.	Topic/Sub Topic	Intended Learning Outcome (ILO) (Objective)	Remark
1.	MANAGEMENT AN OVERVIEW:	Student will be able to;	
1.1	What is Management ?	- Knows about Management. - Defines Management.	
1.2	Brief history of Management	- Knows the history of Management.	
1.3	Function of Management	* Understands the concepts of Management. - Explains the functions of Management.	
	- Planning - Organizing - Staffing - Directing - Co-ordinating - Controlling - Reporting - Innovating - Budgeting - Evaluation		
1.3.1	Management Phases - Preplanning, Planning, Implementation and control.	- Explains the different phases of management. - Explains that the planning is a continuous process.	
1.4	Applications of management.	* Understand the universality of the concept of application of management in different areas. - Outline the area of application of Management concepts in practice.	different areas such as Finance, Personal, Marketing, Purchasing, storing etc.
1.5	System Approach	* Applies the concepts of system approach. - Defines the term system. - Lists the parameters of a system	
	(I) Definition & parameters		
	(II) Classification of system	- Define open, closed, isolated systems. - Define Productive Non productive and service systems.	

(III) System design procedure

- Explains the system design procedure.
- Give a situation, applies the concepts to design a system.

(IV) Evaluation of system

- Defines the terms productivity and effectiveness of a system.
- Justifies the importance of measuring effectiveness of a system.

2. ORGANIZATION AND ORGANIZATIONAL CLIMATE.

2.1 Introduction - Definition & illustration

- * Know about the organization.

2.2 Principles of Organization

- Explain the principles of organization.

2.3 Organisational structure and organisational chart.

- * Understand the basic elements of organisational structure.
- Prepare an organisational chart for an organisation.

2.4 Types of Organisation

- * Understand different type of Organisations.
- Distinguish between different types of organisation.
- Show examples of different type of Organization from real life.

2.5 Classification of organisation

- * Know the classification of organisations.
- Classify organisation on the basis of Function, Product, Customer and location.

Show example of the organisation based on Function, Product, Customer and location.

2.6 Authority and Delegation of authority.

- * Know the basic principles of and its delegation.
- Define authority.
- Explain process of delegation of authority.

Centralisation & and decentralisation.

- State the purpose of centralisation and Decentralisation.

Authority and Responsibility.

- State relationship between authority and responsibility.

28/1/93

2.7 Group Dynamics

- Concept
- Characteristics of groups.
- Reason for formation of groups.
- Types of groups
- Advantages and disadvantages of groups.

- Know the concept of group dynamics
- Define basic characteristics of groups.
- Explain reason for formation of groups
- List different type of groups such as formal, informal groups.
- List advantages and disadvantages of groups.

2.8 Organisational change

- Introduction
- Causes of organisational change.
- Response to change
- Process of change
- Resistance to change
- Overcoming resistance to change.

- * Applies the concepts of managing change in a given situation.
- Define organisational change.
- Identifies the causes of organisational change.
- Explain the process of change.
- State the causes of resistance to change.
- Give a situation & suggests the method of overcoming resistance to change.

- Through case study.

2.9 Organisational Conflict

- Concept
- Types of conflict
- Process/Stages of conflict
- Source of conflict
- Resolution of conflict or modes of conflict management.

- * Understand the concept of organisation conflict and its management.
- Define conflict.
- Recognise different type of conflicts.
- * Describe the process of conflict.
- Identify the sources of conflict.
- Give the strategies for resolution of conflict.

Conflict between individuals
conflict between an individual & group.
Conflict between groups within an organisation.
Conflict between organisations.

3. HUMAN FACTORS IN PRODUCTION.

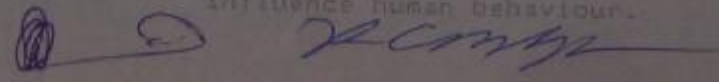
3.1 Managing Men

3.1.1. Motivation:

- Introduction
- Factors affecting motivation

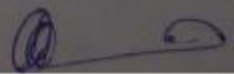
- * Understands the importance of motivation.
- Defines motivation.
- List the important factors that influence human behaviour.

Explain about job/company environment & internal human needs.



28/04

- 3.1.2. Motivation process.
 - Explains the motivation process. Describes: Aggressiveness, acquisitiveness, self assertion, gregariousness.
- 3.1.3. Secondary motivation drives
 - Explains the secondary motivating devices.
- 3.1.4. Outlet for drives
 - Expression
 - Repression
 - Control and re-direction.
- 3.1.5. Behavioural Theories
 - Discuss importance of Behavioural Theories.
 - Explain behavioural theories.
 - ~~List the ingredients of leadership~~
- 3.1.6. Morale.
 - Definition
 - Importance
 - * Understands the concepts related with Morale.
- 3.1.7. Morale and Productivity.
 - Defines morale.
 - Explains the importance of Morale.
 - Correlate morale with productivity.
- 3.1.8. Job - satisfaction.
 - Importance
 - Factors
 - * Understands the concepts related with job satisfaction.
 - Explains the importance of job satisfaction.
 - List the factors, to be considered in designing a job, for giving job satisfaction.
- 3.1.9. Training.
 - Concept of Training
 - Need of Training
 - Benefits of training
 - * Understands the concepts of training
 - Explains the need of training
 - Explains the benefits of training.
- 3.2 Leadership.
 - Definition.
 - * Understand leadership.
 - Define leadership.
- 3.2.1. Personal skill required such as persuasion, influence and Rapport.
 - List the ingredients of leadership.
- 3.2.2. Leadership qualities.
 - Identify qualities in a leadership.

Kanby
29/6


28/195

3.2.3. Relationship between motivation and leadership.

- Establish relationship between motivation and leadership.

3.2.4. Kinds of leadership
Traditional

- Autocratic
- Democratic
- Free Rein

- List types of leadership styles.
- Describe different types of leadership styles.

3.3. MANAGEMENT BY OBJECTIVES

- Knows the concept of MBO

3.3.1. Introduction to MBO

- Describes the MBO

3.3.2. Application of MBO

- Advantages and disadvantages of MBO.

- State the various applications of MBO.
- List the advantages and disadvantages of MBO.

3.3.3 Management Grid

- Explain chart of management grid

3.4. Supervision:

- * Understand the importance of supervision.

3.4.1. Definition of Supervisor's role.

- Define the role of Supervisor

3.4.2. Personal attitudes of supervisor.

- Identify personal attitudes required in a Supervisor.

3.4.3. Duties and responsibilities of a Supervisor.

- List the duties and responsibilities of a Supervisor.

3.5. Time Management:

3.5.1. Importance

- * Appreciate the importance of time management.

- Importance.
- Main features:
 - a) Learn management and organization principles.

3.5.2. Techniques employed.

- Steps to be taken.
- Avoiding time wastes.
- Communication as pests.
- Using diaries.

- Explain the Steps which could be taken for Managing the time resource effectively.
- Explain the techniques employed for time management.
- List the various electronic gadgets used for better time management.

K. S. S.
25/6

3.6. Communication:

- Definition
- Communication Process

- * Understand Communication
- Define communication.
- Explain the process of communication

28/1/36

- Communication types
- Communication Channels
- communication Barriers

- Name the types of communication.
- Describe channels of communication.
- List the barriers in communication.

3.6.1. Effective communication

- Person to Person
- With Groups
- In meetings/Committees

- Explain the method of communications with
 - a person
 - in groups
 - in meetings/committees.

* Writing a letter.

- Categories of letter.
 - Important.
 - Routine.
- Organization of the letter (Four section).

- Knows the concepts related with written communication.
- States the Categories of letter.

- Information
 - Starting with the most important point.
- Supporting details, evidence and view.
- Summary starting the conclusions actions needed to follow.
- Closure- Thanks giving etc.

- Describes the organization of letter with suitable example.

* Memoranda :-

- Definition.
- Difference between a letter and memorandum.

- Defines Memoranda.
- Illustrate difference between a letter and a memorandum.

Explain:

- Memos used for interdepartmental communication with in an organization.
- Business letter is an external communication.
- No salutation at the start and end.

* Reports :-

- Definition.
- Task involved in writing reports to include the following aspects-
 - Collection of material.
 - Selection of material.
- Ordering sections.
- Classification of materials.
- Placing sections in a logical order.

- Knows about report writing.

- Defines a report.
- List the tasks involved in writing a report.
- Describes the step-by-step procedure of report writing.

Handwritten signature
28/1



28/197

- Deciding Headings and Sub-headings.
- Writing the report.
- Choosing a style appropriate to the audience.
- Choice of illustrations, table, graphs, diagrams.
- Presentation of the report.

A possible layout may include title page, Summary, table of contents, introduction, text of main body of the report, conclusions, Appendices containing tables, technical conclusions, references etc.

- * Presentation skills.
 - Introduction
 - Scope
- * Verbal Communicating media (Body Language)
- * Phases for group interaction.
 - Preparation phase
 - Subject matter
 - Visual aids
 - Psychological (Overcome nervousness)
 - Presentation phase
 - Pace
 - Timing
 - Voice modulation
 - Eye contact
 - Star/ Introductory pleasantries
 - Stress on the main theme.
 - Keeping on track.
 - Closure (- Summarize).

- * Understand the importance of presentation skill in group.
- * Explain the important role played by body language in verbal communication.
- * Explain the phases and elements to be taken care in group interaction.
- * Give a situation & display the presentation skills.

interaction and the methodology to be adopted.

- * Body language to include Posture, Gesture, voice, Dress.

3.7. PROBLEM SOLVING & DECISION MAKING.

3.7.1. Steps in Problem solving.

- Define the Problem.
- Collect relevant information
- List Possible causes.
- Select the most likely cause.

- * Understand the process of problem solving and decision making.
- Explain systematically the steps involved in problem solving.

Handwritten signature
2/6
Handwritten mark

28/198

- Suggest alternative solution.
- Evaluate alternatives
- Choose one solution
- Plan for implementation
- Receive feed back.
- Replan and implement.

3.7.2. Methods of Problem solving.

- Institution
- Analytical thinking
- Creative Thinking
- Group discussion and Brain storming.
- Lateral Thinking.
- Logic Thinking (Cause-Effect diagram)
- Synectics.

- Describe the method of problem solving.

* SWOT Analysis:-

- Definition (Factors involved)
- Procedure

- * Understands the concepts related with SWOT analysis.
- Define the terms.
- Explain the procedure by illustrating Examples.
- name areas of application

S - Strength
 W - Weakness
 O - Opportunities
 T - Threats.

- Application areas.

3.7.3. Importance of Problem Solving

- Outline the importance of problem solving.

3.7.4. DECISION MAKING:

- Introduction

- Define decision making.

3.7.5. Types of Decisions.

- Classify the decisions in different types.

- Programmed and Non-programmed decision
- Major and Minor decisions.
- Routine and strategic decisions.
- Organizational and personal decisions.
- Policy and operation decision
- Long term, Departmental and Non-economic decisions.

3.7.6. Decision Making Process.

- Explain the right process of decision making.

3.7.7. Barriers in decision making.

- List & Describe the Barriers in Decision making.

3.7.8. Quantitative methods in decision making.

- Introduction.

- Explain the use and importance of Quantitative methods in decision making.

K. C. Singh

28/139

- Deterministic models
- Break Even Analysis.
- Linear Programming
- Capital Budgeting
- Inventory Management

3.7.9. Probabilistic Models.

- Define Probabilistic models.
- Explain different types of models.

Explain expected value model, decision tree, simulation.

3.7.10. Other Techniques.

- List other commonly used techniques in decision making.
- Explain each of these, with their specific area of application.

Name:

- Waiting line theory
- Game Theory
- Information Theory
- Utility Theory
- Heuristic problem solving.

4. MATERIAL MANAGEMENT.

- Functions of Materials Management system encompassing
 - (A) The purchasing
 - (B) Storing and
 - (C) Inventory-control functions
 - (D) Waste management.

- * Understand the concepts about materials management system in an industry.
- State the areas included in the materials management system.
- Justify the importance of the role of Materials Management system in an industry.

- (A) Purchasing
 - Objectives of Purchasing
 - Decisions to be made before purchasing (Apply systems Approach)

- List the objectives of purchasing.
- Give a situation, identify the decisions to be made before the actual purchases are made.

4.2. Material Requisition Planning.

- Definition.
- Importance.
- Factors to be considered.

- Understands the term M.R.P.
- * Explain the Importance of material requisition planning.
- * Describes in brief the factors to be considered for material requisition planning etc.

4.3. Buying Techniques such as Batch, Speculative, scheduled and purchasing by sole supplier agreement

- Explain the different types of buying techniques with examples.

Verma

28/200

- 4.4. Purchasing Procedure
 - * Understand the purchasing procedure
 - Explain the purchasing procedure.
- 4.5. Purchase Documentation
 - know about the different types of formats/related with purchasing
 - state the different types of proforms/forms used in purchasing.
- 4.6. Computerised Purchasing system
 - * Know about the application of computer in purchasing function. Illustrate the application of computer in purchasing.
- 4.7. Purchasing Organization;
 - * Know about the purchasing organization. Organization based on the principle of:
 - Classify purchasing organization. Function, Product, location & stage of manufacturing.
- 4.8. (B) Stores Management
 - Stores functions
 - stores organization centralized and Decentralized.
- 4.8.1. Stores systems and procedures.
 - (i) Identification system
 - Arbitrary approach
 - Symbolic approach
 - State the importance of identification systems related with storage of items in an industry.
- 4.8.2. Standardization, Codification and variety Reduction.
 - * Understand the importance of standardization, Codification and variety Reduction.
 - Explain the terms standardization, Codification and variety Reduction and emphasise their importance.
- 4.9. (C) Inventory control
 - Definition
 - Function of inventory
 - Economic Order Quantity
 - Stock Turnover
 - Definition.
 - Importance.
- * Understand the concept of inventory control.
- Define the term inventory
- State the functions of inventory
- Derive an expression for the Economic Order Quantity.
- Understands the term stock Turnover.
- Defines the term stock turnover ratio.
- Explain the importance of stock turnover.

[Handwritten signature]

[Handwritten initials]

28/201

4.9.1. Inventory Models:
Order Quantity, buffer stock,
Reorder point, Lead time,
Stack out.

- States its applications on inventory control etc.
- Define the terms model, inventory model and different terms used in relation to Inventory models.
- State the functions of inventory models.

4.9.2. Fixed Order Quantity Model
(Wilson model) without and
with bufferstock.

- Derive an expression for Economic Order Quantity (EOQ).
- compute EOQ with given data.

4.10. Value Engg & Value analysis:
- Introduction to value Engg.
and value analysis.
- Difference between value
Engg. and value analysis.

- * Understands the concepts of value Engineering and value analysis.
- Defines the term value, value engg. and value analysis.
- Gives the types of value.
- State the objectives of Value Engg.
- State the reasons for unnecessary costs.

- * Scope and objectives
- * Reasons for unnecessary costs
- * DARSIRI method for value analysis.

- Explains the DARSIRI method for value analysis etc.
- * Concepts can be reinforced by taking a case study.

5. Production Planning and control.

- Introduction
- Productivity.
- Definition.
- Importance.
- Factors to be considered.

- * Understand the functions of PPC.
- Explain the functions of PPC.
- Understands the concepts related Productivity.
- Defines the term Productivity.
- Explain the importance of productivity.
- Describe in brief the factors to be considered for improving productivity.

* Suitable examples can be quoted.

5.1 Planning for Men, Machines,
Materials, Estimating, Routing,
Scheduling, Despatching, Follow-
up, Inspection and Evaluation.
- Sequencing

- Define the terms sequencing and loading.

5.2 Loading and Scheduling

- Establish that scheduling is preceded by sequencing and loading etc.

[Handwritten signature]

[Handwritten initials]

28/202

- * Critical Ratio.
- Definition.
- Importance.

- Know about critical ratio.
- + Defines the term Critical Ratio.
- States the importance of Critical Ratio in the scheduling of activities etc.

5.3 Types of Production systems;
Job, Batch, Mass/Flow, Group
Technology, FMS project.

- * Know about Production Systems
- Classify the production systems
- State the characteristics of different types of production systems.

5.4 Determination of optimum/
Economic batch size for
production.

- * Understand the method of finding Economic Batch size for production given the necessary data, compute the optimum batch size for production.

5.5 Documents used in production

- * Know about the different types of + Display the formats used for PPC in an industry. different type of
- State the different types of formats used in the PPD and their functions execution.

6.0 PROJECT PLANNING BY NETWORK
ANALYSIS:
Introduction & Definition

- + Understand the concepts of Project Management.

6.1. Steps/Phases of project
management;
- Preplanning
- Planning to include scheduling
- Implementation
- Controlling
- Reviewing and updating.

- Define the term project.
- Explain the steps/phases of project management.

6.2. Tools/Techniques applied for
project management

- Bar charts & Milestone charts (Gantt chart)
- Network methods, i.e. C.P.M. & P.E.R.T.
- Development of Network.
- Fulkerson's Rule for numbering events.
- Updating, Crashing
- Resource profile
- Resource smoothing/

- Apply the techniques used for Project Management.
- Explain the procedure of drawing a Gantt chart.
- Interpret the Gantt chart.
- Give necessary data & draw the Gantt chart.
- Explain the procedure for developing a Network, Updating and Resource levelling.
- Differentiate between C.P.M. and P.E.R.T.
- Given necessary data, develop the network giving numbers to events according to Fulkerson's Rule.

[Handwritten signature]



28/203

Resource levelling.

Update the network, draw Resource profile, and smoothen the Resource profile etc.

7. WORK STUDY

- * Introduction
- * Objectives
- * Components - Method study and work measurement.

- * Knows about work study.
- State objectives of work study
- List the types of studies performed in work study.

7.1. Method study

- * Introduction
- * Objectives
- * Steps for method study

- * Understand Method Study.
- States objectives of method study performing.
- Describes procedure of performing method study.
- * Applies the concepts of method study in practice.
- Give the situation, performs method study.

7.2. Work Measurement

- Procedure
- Techniques to include the Time study, Work sampling, Predetermined motion time system.

- * Understand Work Measurement.
- Describes procedure of work measurement.
- State techniques of work measurement

7.3. Principles of motion economy.

- States principles of motion economy.

8. Maintenance, Safety & Pollution control.

8.1 Maintenance of the facilities.

- Objectives
- Types of maintenance such as :
 - Breakdown maintenance
 - Scheduled (Planned) maintenance.
 - Preventive maintenance
 - Condition based/ Predictive maintenance.
 - Running maintenance.
 - Corrective maintenance
 - Design out maintenance

- Understand the concepts about maintenance of facilities.
- State the objectives of maintenance of facilities.
- Correlate the importance of proper maintenance of facilities installed in an industry with the growing competitive market, cost, quality of product and morale of the workers point of view.
- State the different types of maintenance practices and their characteristics.

[Handwritten signature]

[Handwritten initials]

28/204

- 8.1.1 Maintenance Documentation such as :
History card, Preventive maintenance schedule etc.
Know about the different types of maintenance records kept in an industry.
- State the different types of records kept about maintenance of facilities and their importance.
Display formats of different types of records kept in Maintenance department of an industry.
- 8.2 Safety
- 8.2.1 Introduction
Understand the importance of safety in an industry.
- 8.2.2 Accident process sequence to include:
 - Lack of control
 - Basic causes (origins)
 - Immediate causes (unsafe acts or conditions)
 - Accident occurrence
 - Injury and damage (loss)- Explains the importance of safety in an industry.
- Explains the causes and sequence of occurrence of an accident.
- 8.2.3 Role of management in the prevention of accidents.
- Explains the role of management in the prevention of accidents.
- 8.2.4 Safety hazards and their relationship with accidents.
- Defines the term safety hazards
- Explains the relationship of safety
- 8.2.5 Safety programs
- 8.2.5.1 Reasons for launching safety programs to include
 - (a) moral or ethical
 - (b) legal and
 - (c) economic- State the reasons for launching safety programs in industry.
- 8.2.5.2 Requisites for accidents
- Explains the requisites for accidents prevention.
- 8.2.6 Prevention to include
 - (a) Existence of safety policy
 - (b) Top management support
 - (c) willingness for allocation of financial support.
- 8.2.7 Safety programs to include:
 - (a) Safety committees
 - (b) Safety Education and Training
 - (c) Safety Engineering
 - (Safe-work methods,
 - equipment,
 - processes
 - work place and
 - working elements.)- Explains the step taken in launching safety programs in an industry.
- Explains the aspects considered in safety engineering etc.

[Handwritten signature]

28/205

- (d) Safety in job design
- (e) Safety inspection
- (f) Accident investigation and analysis.
- (g) Records and record keeping.

- 8.3. Environment Pollution and control. Understand the concepts about pollution & control.
- 8.3.1 - Factors causing pollution
- Effects of pollution on human health. - List the factor causing pollution
- State the effects of pollution on human health.
- 8.3.2 Air Pollution and control Understand the concepts about air pollution and control.
- sources of Air Pollution
 - Effects of air pollution
 - Air pollution control and related devices.
- List the sources of air pollution
- state the effects of air pollution
- explain in brief the methods of air pollution control and devices used.
- 8.3.3 Water Pollution and control Understand the concepts about water pollution and control.
- Introduction
 - classification of water pollutants.
 - sources of water pollution
 - Control of water pollution.
- Classify the water pollutants
- State the sources of water pollution.
- State the methods adopted for the control of water pollution.
- 8.3.4 Noise and its control Understand the importance of noise control.
- Introduction
 - Sources of noise
 - Noise control
- State the sources of noise
- Explain in brief methods of noise control.
- Explain the importance of noise control in an industry.
9. APPLICATION OF COMPUTERS IN MANAGEMENT. * Understand the managerial applications of Computers.
- 9.1. Role of Computers in effective performance of various management functions. - Describe the role of Computers in management functions.
- 9.2. Application of Computer in:
- Finance.
- Production - List the application of Computers in different functions of management.
- Explain, how Computers can be used

Handwritten signature

Handwritten initials

24/206

- Inventories
- Maintenance.
- Marketing.
- Personnel.
- Process-Planning.

- to enhance effectiveness of management of these functions.
- List the commonly used and latest software packages for application of computers.
- list the important features of these packages.

10. NEW TRENDS IN MANAGEMENT.

10.1. TOTAL QUALITY MANAGEMENT

* Introduction.

- * Understands the importance and related concepts about Total Quality Management. S.S.Dale & J.J. Plunkett.

* Ref: Management Quality. Edited by - J.J. Plunkett.

10.2. Stages of development.

- Inspection
- Quality control
- Quality assurance
- Product assurance
- Total Quality Control (TQM)
- Total Quality Management.

- Explain the different stages of development of T.Q.M.

10.3. Philip Crosby's five absolutes of Quality Management.

- List the five Philip Crosby's essentials in regard to quality management.

10.4. W.E. Deming's fourteen point approach about improving quality and Deming's PDCA cycle (plan, Do, check, Action)

- States the Deming's approach about improving quality.
- Explains Deming's PDCA cycle.

10.5. The Juran trilogy : Quality-Planning, Control and improvement) and two major kinds of quality management (break through encouraging the occurrence of good things, to attack chronic problems; and control- Preventing the occurrence of bad things, to attack sporadic problems)

- Explains the Juran Trilogy.
- Explains the two major kinds of quality Management.

10.6. Feigenbaum's Concepts about total quality cost comprising of -Appraisal cost, Prevention cost and Failure Cost.

- Explains Feigenbaum's approach about total quality.

Handwritten signature

Handwritten mark

28/207

Taguchi Quality System
cycle off-line and on-line;
and Quadratic (Taguchi)
quality/loss function.

- State Taguchi Quality System Cycle.
- State Taguchi's loss function.

Japanese Quality Management
Culture :-
-Kaizen strategy (continuous
improvement)
-Quality Circle
-Ishikawa's Cause and Effect
Diagram (Fishbone Diagram)

- Appreciates Japanese concepts
about TQM.
- State Kaizen strategy.
- Explains the concept of Quality Circle.
- Explains the Ishikawa's Cause and
effect diagram with suitable
illustrations.

Logic Structures

- Definition
- Purpose
- Procedure
- Application area

- * Understands the concepts related
with Logic Structures.
- Define the term.
- Explain the purpose and procedure
of developing of Logic Structure
by giving illustrations.

[Handwritten signature]

[Handwritten mark]

29/208

uggested list of books:

Belts, P.W., Supervisory Management, 6th edition,
(ELBS with Pitman Publishing, 1994)

Khanna, O.P., Industrial Engineering and Management
(Dhanpat Rai and Sons 1995)

Koontz, O'Donnell, Weihrich, Essentials of Management,
4th Edition, (Mc Graw-Hill Book company 1986)

Indira Gandhi National Open University, module published
for Diploma in Management Course.

Buffa, Modern Production operations Management,
7th edition (Wiley Eastern Ltd., 1983)

Goel, B.S., Production Operations Management (Pragati
Prakashan, 1986)

28/209

Final year Diploma in Electronics Engineering. (Y-Scheme)
(INDUSTRIAL ELECTRONICS)

Subject/Course : REPAIR, MAINTENANCE AND TESTING WORKSHOP
Code : IEY-308

Rationale :

All the subjects include a topic of Maintenance/Repair and safety for circuits and equipment related to the subject. That gives an idea in brief how to go for the maintenance/Repair of the circuits or equipment. The time period allotted for the lab work is mostly used for the understanding the functional aspect of circuit/equipment and the student only learns the maintenance/repair aspect. He does not get enough time to practice his knowledge and develop skills required for maintenance/repair.

This subject solely a practical one, allows the student to practice the procedure of maintenance/repair that makes him more confident in taking up any maintenance/repair work.

All the maintenance/repair work has to be done by the student with his own hands in the laboratory on actual circuits/equipment with his knowledge and help of maintenance manual, Troubleshooting charts, circuit diagrams etc. available with the equipment to be maintained or repaired. This will lead to repair of institutional equipment and maintain them in working order. This will give the student to practice the Safety Rules to be followed in real life regarding personal and equipment safety.

28/2/10

Final year Diploma in Electronics Engineering. (Y-Scheme)
(INDUSTRIAL ELECTRONICS)

Subject/Course : REPAIR, MAINTENANCE AND TESTING WORKSHOP
Code : IEY-308

Scheme of Studies :

S.No.	Topic	Theory	Practical	Total
1.	Electronic circuits & Equipment.	-	56	56
2.	Electrical Circuits & Equipment.	-	28	28
3.	Safety	-	12	12
Total		-	96	96

Handwritten signature

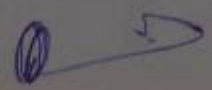
Handwritten signature



28/211

S.No.	Topic/Sub Topic	Intended Learning Outcome (ILO)	Remark.
1.	<u>Electronic Equipment</u>	Student will be able to :	
1.1	Electrical Circuit (Power-Input Protection, indication etc.)	<ul style="list-style-type: none"> - Test the availability of input power to the circuit or equipment. - identify the mounting & components like power cord, switch, fuse, fuse holder, relay, heat sink, lighted switch, indicators & display, connectors, socket, in the circuit. - identify the specifications of the above items (Electrical Ratings, physical size, etc.) - Test & replace above electrical items & components in electronic equipment. 	Practice of using operation manual & spare part list to be referred wherever available & is recommended.
1.2	Electronic Circuits		
1.2.1	Simple wired circuits (conventional circuits & equipment with chassis mounted components)	<ul style="list-style-type: none"> - Identify the components and trace the circuit. - Identify the testing points to test the function of the components & ckt. - Identify faulty components - replace faulty components with exact/suitable equivalent component. 	Old wired circuits, equipment can be used for this practice of circuit tracing, soldering, desoldering, Frequent use of multi-meter & other test equipment.
1.2.2	Complex Circuits Boards (Small P.C.B)	<ul style="list-style-type: none"> - Identify & subdivide various functional blocks/section of a complex circuit board, with their input & output (V,I,wave form etc.) - identify test points on various functional blocks for testing. - identify faulty section - identify faulty component - replace faulty component - dismount and mount special components like I.C. of different type & pin configuration. - enlist & practice precautions in handling, soldering, desoldering sensitive ICs like CMOS, MOSFETs. 	Practice desoldering, soldering of components on P.C.B. Linear & digital IC to be dismantled on PCB or on sockets Practice on Power-Supplies signal sources CRD, DMM, & other equipment to be given in practice.

Handwritten signature



28/212

1.2.3 Very complex circuits
(Large size P.C.B)

- Study the circuit and locate component on single & double sided PCB.
- Identify test & measuring points on PCB as per manual & circuit diagram.
- Test & measure the signals on test points analyse fault.
- Replace the faulty component.
- Record the symptoms/indications of faulty equipment & remedy carried-out.

Practice on T.V,VCR,or Drive circuits,control circuits available in the institution.

Faults can be simulated on good equipment if possible. Study & preparation of trouble shooting charts will help the student if available.

1.2.4 High tech Electronic Equipment
(Large PCB, & Cards.)

- Identify & list the symptoms of faulty equipment.
- Study the trouble shooting chart
- Locate the faulty section
- Replace or repair faulty section or card as recommended.

- Computers,Fax,Photo-copiers & other high-tech equipment servicing guides, to be used.
- Help of Service Engineers may be taken while they are working on equipment in the institution.
- Expert Lecturer,demonstration by service engineers may be arranged.

- dust & clean the moving contacts, and lubricate moving parts in the equipment.

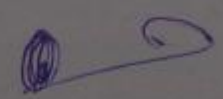
- Only recommended lubricants and cleaning chemicals to be used.

1.3.0 Documentation

- Prepare & maintain documentation of equipment, History card, Inventory card, spares inventory.
- document the repairs, replacement carried out on the equipment.

Standard formats of documentation to be given to the students for filling up & keeping records.

[Handwritten signature]



28/213

2 Electrical Circuits

2.1 Power wiring and circuits
(Switch gears)

- 1. Test the availability of 3 phase supply using a Voltmeter/Multi-meter/Test lamp.
- 2. check fuses in the supply circuit.
- 3. Select HRC fuse/Fuse wire for the given power circuit.
- 4. check ICEP/ICTP for proper functioning/condition of contacts/firness of contact.

2.2 Contactor circuits

- Test the operating coil for its soundness/proper functioning.

2.3 Starters (DOL/Star-Delta)

- 1. check the main/auxiliary contacts for cleanliness/polish.
- 2. Polish/Replace the pitted contacts.
- 3. check the spring for proper functioning (Tension)
- 4. check overload setting of the starter.
- 5. Check the time setting of timers, timer circuit, and adjust if required.
- Prepare preventive maintenance schedule.

Symptoms of sparking contacts, chattering noise.
Use recommended charts from manufacturers. Semi Automatic & automatic D.Y. starters.

Use manufacturers recommended manuals & method.

2.4 Electrical Machines
AC & DC.

- Clean/blow air the machine.
- feel/check temperature of bearing at both ends.
- check bearing noise at both ends.

2.4.1 A.C. Machine (Motors)

- Over haul a small motor (AC)
- check starting current, speed, I.R. value, bearing condition before overhaul.
- open the motor
- check condition of stator-rotor winding.
- check condition of bearing after cleaning, replace if required.

1 to 3 HP motor (1 or 3 phase to be given for overhauling.

Recommended maintenance schedule to be studied & followed.

[Handwritten signature]

[Handwritten scribble]

28/2/14

- grease the bearing
- Re assemble the motor
- check current, speed, IR value after over hauling.
- Tabulate activities and results.

2.4.2 DC Machines (Motors)

- Check condition of carbon brushes
- Replace carbon brushes
- check commutator condition
- clean & polish commutator

- overhauling a small DC Machine (As in 2.4.1)

Small DC machine may be given for overhauling if available maintenance practice on any DC machine can be done, except overhauling. Study of trouble shooting charts recommended to be followed.

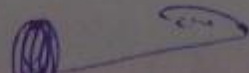
10

Safety

(Personal Safety)

- Check condition of personal safety devices & provisions.
 1. Rubber matting
 2. Rubber hand gloves
 3. Insulated hand tools
 4. Insulation resistance of machines & equipment using 48 volt & above.
 5. Readiness of fire fighting equipment.
 6. Check earth connections & their continuity.

K. S. S.



28/215

Suggested List of experiments :

Since this is workshop practice course, the practice of maintenance ,troubleshooting & repair work will have to be done on actual faulty circuits & equipment available in the institution like;

- 1) Power Supplies
- 2) Multimeters
- 3) Signal Sources
- 4) C.R.O
- 5) T.V.
- 6) V.C.R
- 7) Drive circuits & Experimental Boards
- 8) Fault simulated equipment

ON High-Tech equipment the student may be given a chance to accompany the service engineers of high tech equipment of the institution like computers, photocopiers, fax machine Guest lectures & demonstration by service engineers may also be arranged in this part of curriculum.

ON electrical side the student may be exposed to minor Maintenance/Repair of electrical motors & switch gears.

- 1) Maintenance of Contactors.
- 2) Over hauling of a small motor.
- 3) Testing of motor for its current,speed,I.R. values etc. before & after maintenance.

[Handwritten signature]

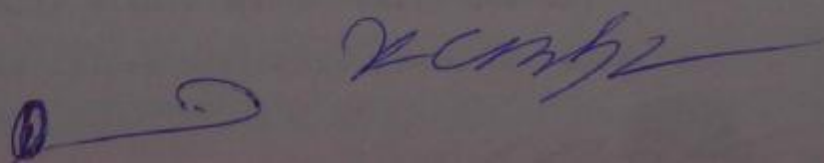
[Handwritten mark]

28/2/16

Suggested list of referances/books:

No text book can be prescribed for this course however any of the following books can be used as guide.

S.No.	Title	Authors	Publishers
1)	Modern Electronic Equipment (Trouble shooting Repair & Maintenance.	R.S.Khandpur	T.M.H.
2)	Electronic Testing & fault diagnosis.	G.C.Lovaday	Wheeler
3)	Electrical & Electronic Maintenance. ETG-24 (Engg.Training Guide)		EITB
4)	Maintenance Manuals of the electronic equipment.		
5)	Circuit Diagrams Book for various T.V & V.C.R commercially available.		BPB
6)	Hand Books for Maintenance Engg. (Electronics)		
7)	SAMS, IBM PC Trouble-shooting and guide.	Robber S.C.Brenner	BPB.



28/217

Final year Diploma in Electronics Engineering. (Y-Scheme)
(INDUSTRIAL ELECTRONICS)

Subject/Course : PROJECT-WORK
Code : IEY - 309

Rationale :

Project work is the area in which a student can show his creativity, resourcefulness, knowledge and various skills attained through the labs and work-shop during the course duration.

Project work leads the student to develop his original thinking, group-discussion, leadership, interpersonal relations, inter disciplinary relation and polishes his behaviour in the society.

He is also exposed to market-survey for procurement of components, suiting to the circuit, their equivalents, the process of try outs of circuits, modification of circuit values and finally getting the desired result.

An electronics diploma student has very vast scope of preparing project, as electronics has entered in every walk of life of the society and every hour of one's daily life.

The support of the institution, faculty members, and supporting staff is of paramount importance and their quality is also reflected in the quality of the final shape of the project.

A good project-work earns credit for all concerned and increase scope of employment/self employment when presented to potential employer. With this view curriculum can not be bound in any limits & boundry on papers. Reasonable freedom has to be given for selecting the project work as far as the project is feasible and economically viable and socially useful.

Only few guide lines have been given for selection of project work.

28/218

Suggested topics/units for preparation of projects for Industrial Electronics:

- Working models for explaining various types of controls like conveyor system, using limit switches, proximity switches, micro-switches etc. performing, start stop, reverse, sequential & logic operation of a motor.
- Infra red remote control systems for domestic & industrial use.
- Microprocessor based control system for motor/power supplies etc.
- Prototype solution for any industrial problem with help of the industry.
- *Conversion of conventional control scheme & some of the PLC applications.*

However the care should be taken that the project work should depict the following abilities & skills of the student.

1. Identification of project by Market survey and Industrial survey.
2. Selection/Design of a circuit for desired output.
3. Try-out & modification of the selected circuit/given circuit.
4. Design & fabrication of PCB & component mounting.
5. Procurement of components & equivalents.
6. Working skill of fabrication of the cabinet/chassis and mounting components & controls, displays.
7. Testing of product and test report.
8. Market survey for product sales & economic viability of product (for Entrepreneurship)
9. Costing of the Project/Product
 - i) Capital costs
 - ii) Material & production cost (for entrepreneurship)
10. Identify and approach various Agencies for financial and technical assistance (for entrepreneurship)
11. Documentation of project report
 - i) Drafting
 - ii) Sketching
 - iii) Layout
 - iv) Presentation

[Handwritten signature]

[Handwritten signature]

28/219

Suggested Books & Sources for guidance to student for selection of project work :

1. Electronics Magazines & journals.
2. District Industries Centre
3. Industrial problems discussed during industry visit /Training.
4. Entrepreneurship Development Board magazine.
5. "Prime Minister Rojgar Yojana" projects from District Collectorate.

