



(...Nurturing Talents to Success)

**DR. A P J ABDUL KALAM UNIVERSITY,
INDORE**

SYLLABUS

For

DIPLOMA ELECTRONICS & TELECOMMUNICATION

(3rd YEAR, 6th SEM)

Dr. A P J Abdul Kalam University, Indore

DR. A P J ABDUL KALAM UNIVERSITY, INDORE

Syllabus for Diploma Electronics & Telecommunication

List of Subject (3rd Year, 6th Semester)

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Unit 1**Audio Technology**

- Principle & working of microphone
- Types of microphone and their application:
 - Carbon granule microphone
 - Condenser
 - Ribbon
 - Crystal
- Principle & working of speakers
- Types of speakers: PMMC
- Frequency response of speaker
- Audio amplifier
- Application of audio amplifiers: PA system

Unit 2**Broad Casting Receiver**

- AM Receiver: Explain-
 - TRF
 - super heterodyne
 - Double heterodyne
- FM Receiver
 - Ratio Detector
 - Foster seeley phase discriminator
 - FM Channels
- Qualities of receivers

Unit 3**TV Technology**

- Principles of Television:
 - TV standards
 - Scanning
 - Video Bandwidth
 - Modulation techniques
 - Channel allocation
 - Composite Video signal
- TV Camera – Principle & working of Videocon TV Camera.
- TV Receiver – block diagram and working of B&W receiver and PAL Receiver
- Display Technologies:
 - CRT Monitor
 - LCD Monitor
 - PLASMA monitor

Unit 4**Media Players**

- Block Diagram of Players:
 - Audio CD Players
 - Video CD Players
 - DVD Players
- Introduction to Blue Ray disc player, HD DVD.

Unit 5**Multimedia**

- Introduction to multimedia, Different audio and video formats related to multimedia, MPEG1, MPEG2, MPEG3, MPEG4, Multimedia editing tools- Movie Maker, Nero wave editor.
- Application of multimedia in education, entertainment, advertisement, research.
- PROJECTORS :
 - DLP Projector
 - LCD Projector
 - LED Projector

Unit 5

Security & Safety System:

- Burglar's alarm
- Video door phone
- CCTV
- Electronic combination locks
- Fire alarm.

List of Experiments

1. Study of different microphones & speakers
2. Plotting of directional property of microphones & Speakers
3. Frequency response character of microphones & speakers
4. Study of audio amplifiers stages (pre amplifier, voltage amplifier, power amplifier)
5. Study of AM receiver characteristics i.e. sensitivity, selectivity, fidelity, SNR, stability
6. Study of FM receiver characteristics i.e. sensitivity, selectivity, fidelity, SNR, stability
7. Demonstrate B/W TV receiver
8. Demonstrate Color TV receiver
9. Study of composite video signal using pattern generator
10. Market survey of different types of monitors & their comparison
11. Assembly & disassembly of CD player mechanism
12. Market survey & comparison of different types of monitors i.e. LCD, CRT, LED monitors
13. Production of multimedia CD using general multimedia software i.e. Movie maker
14. Study of multimedia format
15. Study of security and safety systems

LIST OF EQUIPMENT

1. B & W TV Trainer
2. Color TV Trainer
3. 3 Band AM/FM/SW Radio Receiver Trainer
4. RF Signal Generator
5. TV Pattern Generator
6. Sound Level Meter
7. Audio Output Power Meter
8. Low distortion Audio Generator
9. FM Stereo Trainer
10. VCD Player Trainer
11. Programmable Signal Generator
12. Multiple Power Supply
13. Function Generator
14. C.R.O. (Cathod Ray Oscilloscope)
15. Multimeter

References

1. Monochrome & Color TV- R.R. Gulati
2. Television – Dhake
3. Audio & Video Techniques- R.G.Gupta
4. Electronic Communication- Roody & Coolen
5. Electronic Communication System – Kennedy
6. Audio & Video Techniques- Ajay Sharma

Unit 1**Optical Fiber Communication**

- Light propagation through optical fiber:
 - Basic fiber structure
 - Total internal reflection
 - Numerical Aperture
 - Acceptance angle
- Attenuation in optical fiber
- Dispersion: basics of Modal dispersion, Material and waveguide dispersion, relation between data rate and dispersion
- Types of fibers:
 - Single mode fiber
 - Multimode fiber
 - Graded index fiber; comparison
- Structure of Fiber optics cables
- Optical Communication system: block diagram
- Light source: LED and Laser Diode
- Detectors: PIN photodiode and Avalanche photodiode
- Specification criteria in selection of transmitter & receiver
- Tool for Installation and maintenance: Application of: Optical power meter, OTDR, Fusion Splicing Machine

Unit 2**Cellular Communication**

- The Cellular Concept
- Frequency bands and cellular coverage
- Geometry of a cell: Cell size and Number of possible users
- Frequency reuse and hand-off
- Cellular system implementation:
 - Cell office
 - MTSO
 - Block diagram of cellular hand set
 - Introduction to handset operating systems
- Access technology- FDMA, TDMA & CDMA, comparison
- GSM Services- speech, group call and related services, general packet radio service (GPRS), short message services (SMS)
- CDMA based digital cellular system, spread spectrum modulation, frequency hopping
- Features of Third generation cellular service

Unit 3**Satellite Communication**

- Advantages and disadvantages of Satellite system
- Frequency bands, Uplink and Downlink frequencies
- Satellite basics- Orbits, Altitude, footprint
- Low orbit regional satellites, Geostationary satellite
- Satellite system link model- uplink, transponder, downlink, cross link
- Block diagram of Satellite Earth station
- Block diagram of Satellite and communication transponder
- Satellite multiple access- FDMA, TDMA & CDMA
- TV channel reception via Satellite
- Global Positioning System (GPS) and GPS Navigation basics
- Direct to home (DTH) basics

Unit 4

RADAR

- Basic RADAR system and applications
- Frequencies and Powers used in RADAR
- Definition of Range, pulse width, PRF, duty cycle
- RADAR Range equation and factors that affect Range
- Scanning methods, Search and Track RADAR system
- Display method: PPI
- Basic pulsed RADAR system
- MTI and CW Doppler RADAR

Unit 5

Emerging Trends in Technology

- Bluetooth Technology:
- Introduction - Standards - Services - applications
- Introduction to IP TV
- I phone
- Introduction to WAP, EDGE, HSPDA, OTA, VOIP

List of Experiments

1. Measurement of attenuation in optical fiber
(a) Measurement of Propagation loss (b) Measurement of bending loss
2. Measurement of numerical aperture
3. Measurement of characteristics of fiber optic LED and photo detector.
4. Measurement of Radiation Pattern of LED
5. Forming simple fiber optic analog link.
6. Study of PC- to- PC communication using optical fiber link and two RS 232 cards.
7. Setting up CW Doppler RADAR and measure speed of a moving object
8. Experiments based on Mobile communication
9. Experiments based on GPS system
10. Experiments based Satellite communication
11. Experiments based on Bluetooth devices

List of equipment

1. Fiber Optic Transmitter Trainer Kit
2. Fiber Optic Receiver Trainer Kit
3. Optical Power Meter
4. OTDR
5. Optiscope
6. LED Radiation Pattern Trainer
7. Spectrum Analyzer
8. Mobile Phone Trainer
9. GSM Trainer
10. Navigation and GPS Trainer
11. Satellite Communication Trainer
12. RADAR Trainer
13. CDMA Trainer
14. Function Generator
15. CRO

Unit 1**Introduction**

Program concept, Assembler, Compiler & Interpreter, characteristics of a good program, various stages in program development, Algorithms, Flowcharts, pseudo codes, programming technique- top down, bottom-up, structured programming.

Unit 2**Fundamentals of C**

History & Features of C, C program structure, pre-processor directives, C tokens character set, keywords, identifiers, constants, variables, data types, data types conversion, Expressions, Statements, Use of header files, Defining macros, input/output functions- printf(), scanf(), getchar(), putchar(), gets(), puts() etc.

Formatted I/O using control string.

Unit 3**Operators in C**

Arithmetic Operators, Logical Operators, assignment operator, Relational Operators, Bitwise Operators, Special Operators: exp, exit(), sizeof(), increment and decrement (post and pre) operators-precedence & associativity, Type casting, C expression data type, order of evaluation of expression.

Unit 4**Control Statements**

Loop statements: for statement, while statement, Do-while statement, break continue statement, nested loop.

Branching statements: if statement, if- else, nested if. Unconditional branching: go to statement multiple branching statements: switch case statement.

Unit 5**FUNCTIONS**

Basics of function, types of C Functions, Bindings of function, parameters of functions, local and global variables. **User-defined Functions** - Function declaration, Function prototype, scope and life of variable-actual, formal, call by value, call by reference. Implementations, Accessing a Functions, Arguments and Parameter passing mechanisms, recursion, Storage classes – static auto, extern, and register. **Built-in function:** declaration, Accessing, Parameter passing.

Unit 6**ARRAY, STRING & POINTER**

Array: Concept of one dimensional and Multi-dimensional array, array declaration, Array initialization, operations on one and two-dimensional arrays.

String Manipulations: Strings, gets(), puts(), string operations, string function (concatenation, comparison, length of a string etc.)

Pointers Definition, Types, Declaration, & and * operator, pointer expression, pointer arithmetic, pointer to pointer, array of pointer, pointer to function. Dynamic memory management -malloc(), calloc() and free.

Unit 7

BASICS OF STRUCTURE, UNION and FILES

Structure: Definition, Declaration, initializing structure, membership operator, accessing structure elements

Union:- Definition, Declaration and Implementations. **File handling:** File system basics, Opening & closing file, Reading & writing in file, File opening modes, String I/O in files.

Unit 8

OTHER PROGRAMING LANGUAGES:

Basic Concepts Of Object Oriented Programming, Classes and Objects, Inheritance, Polymorphism, Abstraction, Encapsulation, Dynamic Binding, Message Passing, Fundamental Understanding and programming of C++, Characteristics and Features of C++, Difference between C and C++, Applications of C++, Fundamental Understanding and programming of Java, Characteristics and Features of Java, Applications of Java, Difference between C++ and Java.

List of Experiments

1. Working with turbo C editor
2. Program using printf() scanf() and formatted I/O, string manipulations Defining and using Macros
3. Program using Operators
4. Program using various Control Statements
5. Program using Single dimensional and Two-dimensional array.
6. Program using Functions.
7. Program using call by Value & Call by reference
8. Program using Static, Auto, & Extern function.
9. Program using Structure & Union.
10. Program using Pointers & Files.
11. Program to print hello using classes in c++
12. Program to print hello in java.
13. Program to learn, to write assembly language in C
14. One Small Project must be develop in C & C++ language

References

Text Book:

1. Programming in C, Balaguruswami
2. Let us C, Y. Kanetker

Further Readings:

1. Theory and problems of programming with 'C', Gottfried., Schaum's series
2. Chapman, Understanding windows, BPB Publication
3. C: the complete reference, Herbert schildt, 4 edition, McGraw-Hill Osborne Media
4. Complete reference of C++,
5. Programming in C++, Balaguruswami
6. Complete reference of JAVA

Unit 1**Introduction to PLC**

- What is PLC ,Technical Definition of a PLC
- Advantage of PLC
- Chronological Evolution of a PLC
- Type of PLC
- Block diagram PLC

Unit 2**PLC Hardware, Timers &Counters**

- Relays
- Ladder logic diagram
- PLC Connection
- Electrical Wiring diagram
- JIC Wiring Symbols
- Latches, Timer
- Classification of Timer
- PLC Counters
- Operation of PLC Counter
- Counter Parameters

Unit 3**Advance Instruction & Programming Techniques**

- Introduction
- Comparison Instruction
- Discussions on Comparison Instruction

I. "EQUAL"	ii. "NOTEQUAL"	iii. "LESS THEN"
iv. "LESS THEN OR EQUAL"	v. "GRATER THEN"	
vi. "MASKED COMPARISION FOR EQUAL"	vii. "LIMIT TEST"	
- Mathematical Instruction
- Logical Instruction : Data handling Instruction

Unit 4**PLC Input-Output (I/O) Modules Power Supply**

Introduction, Classification of Input Output Modules, Input-Output System, Sinking Sourcing, Special Input Modules, RTD Input Module, Stepper Motor Control Module, Thermocouple Input Module, Power Supply Configuring, Power Line conditioner Reliability, Safety and Redundancy Filter

Unit 5**PLC Applications**

Distributed control system, (DCS), Industrial control systems (ICS), Programmable automation controller (PAC), Industrial safety systems, SCADA

Unit 6**Industrial Automation & Selection of Programmable Logic Controllers**

Introduction, Utility of automation, Example of some simple Automated Systems, Selection of PLC

List of Experiments

- Develop a Simple Ladder Logic Program that will turn on an output X if input A and B or C is on
- Develop a relay based Controller that will allow three switches in a room to control a single light
- How temperature control system can be developed in a process industry
- Develop a traffic control System
- Speed control of Induction Motor

References

1. PLC Programming Method and Application :-John R Hackworth, Fredric D Hackworth (publication:- Pearson Education)
2. Process Dynamic and control:-D.E.seborg,T.F.Edgar, D.A.Melichamp (publication:-Wiley publication)
3. Programmable Controllers operation and Application (publication :-PHI publication)
4. Programmable Logic Controllers and Industrial Automation an Introduction By:- Madhuchanda Mitra and Samarjit Sen Gupta (publication:-Penram International Publishing (India) Pvt.Ltd.
5. Programmable Logic Controllers By:-W. Bolten
6. Programmable Logic Controllers and Industrial Automation By:- Kelvin Collins (publication:-Exposure Publishing)
7. Programmable Logic Controllers By:-Collin Simpson
8. Programmable Logic Controllers By:-Morriss Brian, (publication :-PHI)

1. Each student undertakes substantial and individual project in an approved area Of the subject and supervised by member of staff.
2. The student must submit outline and action plan for the project execution (time Schedule) and the same be approved by the concerned faculty.
3. The project development must be carried out according to following steps and Final write-up should have the same sequence.
 - Project objectives.
 - Requirement gathering.
 - Modeling of project should be done in any well- known modeling tools.
 - Analysis of Project.
 - Design of Project.
 - Implementation of project.
 - Testing on project.
 - Quality consideration of project.
 - Designing a small user manual.
 - Estimating the cost of the project.
 - Future scope and suggestions.

ACTION PLAN FOR PROJECT WORK AND EVALUATION SCHEME # (SUGGESTIVE):

TASK/PROCESS	WEEK	EVALUTION
Orientation of students by HOD/Project supervisor	1st	-
Literature survey and resource collection	2nd	-
Selection and finalization of topic before a committee*	3rd	-
Detailing and preparation of project (Modeling, Analysis and Design of Project work)	4th to 6th	Seminar -I
Development Stage	7th to 11th	-
Testing, improvements, quality, control of project	12th	-
Acceptance testing	13th	-
Report writing	14th	-
Presentation before a committee (including user manual)	15th	Seminar -II

* Committee comprises of HOD, all project supervisors including external guide from industry(if any).

the above marking scheme is suggestive, it can be changed to alternative scheme Depending on the type of project, but the alternative scheme should be prepared in advance While finalizing the topic of project before a committee and explained to the concerned Student as well.

REFERENCES / SOURCES FOR GUIDANCE TO STUDENT FOR SELECTION OF PROJECT WORK:

1. Electronics Magazines & Journals.
2. District Industries Center.
3. Industry-Institution Interaction (III)
4. Small Scale industry
5. Industrial problems discussed during industry visit/training.
6. Entrepreneurship development Board Magazine.
7. "Prime Minister Rojgar Yojana" projects from district Collectorate.

Professional Activities is not a descriptive course, as per conventional norms; therefore specific content for this course cannot be prescribed. It is a group of openended activities; where in variety of tasks are to be performed, to achieve objectives. However general guidelines for achieving the target and procedure for its assessment are given under the course content. As the student has to practice this course in all the six semesters, the guidelines given therein are common and applicable to each semester.

Objectives:

To allow for professional development of students as per the demand of engineering profession.

- To provide time for organization of student chapter activities of professional bodies) i.e. Institute of engineers, ISTE or Computer Society of India etc.)
- To allow for development of abilities in students for leadership and public speaking through organization of student's seminar etc.
- To provide time for organization of guest lectures by expert engineers/eminent professionals of industry.
- To provide time for organization of technical quiz or group discussion or any other group activity.
- To provide time for visiting library or using Internet.
- To provide time for group discussion or solving case studies.
- To provide time for personality development of students.
- To provide time for working for social cause like awareness for environmental and ecology etc.

DETAILED INSTRUCTIONS TO CONDUCT PROFESSIONAL ACTIVITIES:

A. Study hours, if possible should be given greater time slot with a minimum of two hrs/week to a maximum of four hrs/week.

B. This course should be evaluated on the basis of grades and mark sheet of students, should have a separate mention of the grade awarded. There will be no pass/fail in professional activities (PA).

C. Following grade scale of evaluation of performance in PA has been established. Grades Level of performance

<u>Grades</u>	<u>Level of performance</u>
A	Excellent
B	Good
C	Fair
D	Average
E	Below Expectations

D. Grades once obtained in a particular examination shall become final and no chance of improvement in grades will be given to the students.

E. Assessment of performance in PA is to be done internally by the Institution, twice in a Semester/Term through a simultaneous evaluation of the candidate by a group of three teachers, of the deptt. Concerned. Group of teachers will jointly award the grade to candidate in the assessment. Best of the grades obtained by the student in these two assessments shall be finally taken on the mark sheet of the respective Semester/Term. Candidate abstaining from the

prescribed course work and/or assessment planned at the Institute shall be marked ABSENT in the mark sheet, instead of any grade.

F. While awarding the grades for performance in PA, examining teacher should reach the final consensus based on the attendance, punctuality, interest, presentation skills in seminar on the topic assigned (collection of relevant data, observations, analysis, findings/conclusion) and its written report, awareness of latest developments in the chosen programme of study.

G. Institution shall maintain the record of grades awarded to all the students in PA for a period of 1 year.

H. It shall be mandatory for students to submit a compendium for his PA in the form of a Journal.

I. Compendium shall contain following:

1. Record of written quiz.
2. Report/write up of seminar presented
3. Abstract of the guest lectures arranged in the Institution.
4. Topic and outcome of the group discussion held.
5. Report on the problems solved through case studies.
6. Report on social awareness camps(organized for social and environmental prevention).
7. Report on student chapter activities of professional bodies like ISTE, IE (India), CSI etc.

J. PA is not a descriptive course to be taught in the classroom by a particular teacher. Various activities involved in the achievement of objectives of this course should be distributed to a number of teachers so that the talent and creativity of group of teacher's benefit the treatment of the course content. These activities should preferably be conducted in English language to maintain continuity and provide reinforcement to skill development. Small groups shall be formed like in tutorials, group discussion, case studies, seminar, project methods, roll play and simulation to make the development of personality affective. Treatment of PA demands special efforts, attention, close co-operation and creative instinct on the part of teachers of department concerned. Since this course is totally learner centered, many of the activities planned under this course shall come out from the useful interaction of student, among themselves and with the teachers. The guide teacher/s shall best act as a facilitator of these creative hunts/ exercises, which unfold many of the hidden talents of the students or bring out greater amount of confidence in them, to execute certain activity.