

Principles of Computer Architecture and Maintenance [PCA]

T.Y. Diploma : Sem V
[ET/EJ/EN/EX/IS/IC/IE/DE/EV/MU]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical Exam	–	–
Oral Exam	–	–
Term Work	–	25@
Class Test (Two Test)	–	25 (each)

@ – Internal Assessment

SYLLABUS

1. Motherboard and its Components

- Different types of PC configurations and their comparison
- Chipset basic, chipset Architecture : North/South Bridge architecture and Hub architecture
- Architecture of Intel chipset 915 G& 945 G
- Overview and features of ISA, PCI-X, PCI-Xpress, AGP, Processor Bus (no pin description)
Comparison between PCI and PCI Express
- Logical memory organization : Conventional memory, Extended memory, Expanded memory (No memory map)
- Concept of cache memory : Internal cache, External cache (L1, L2, L3 cache)
- Overview and features of SDRAM, DDR, SDRAM, DDR2, SDRAM, DDR3
- BIOS Basics

2. Storage Devices And Its Interfacing

- Recording Technique : RM, MFM, RLL Perpendicular magnetic recording
 - Hard disk construction and working
 - Terms related to Hard Disk : Track, Sector cylinder, cluster, Head parking, MBR, Zone recording
 - Formatting, Low level formatting, High level formatting, partitioning
- Hard disk drive interface : features of parallel AT attachment (PATA), Serial AT Attachment (SATA), External SATA (no pin discription)
- CDROM drive : Construction, recording
- DVD : Construction, Recording

3. Display Devices & Interfacing

- CRT colour monitor : Block diagram and function of each block
- Characteristics of CRT monitor : Dot pitch, Resolution, Video bandwidth, Horizontal scanning frequency, Interlaced versus non interlaced monitor
- Advantages of CRT display over LCD display
- LCD monitor : functional block diagram of LCD monitor, working principal, advantages and disadvantages Types : Passive matrix and Active matrix, Important characteristics : Resolution, Refresh rate, Response time.
- Basic block diagram of a video accelerator card

4. Input & Output Devices

Construction, working & Installation of :

- Keyboard.
- Mouse: Mechanical, Optomechanical, New optical
- Scanner: Types, Flat bed, Block diagram and specifications.
- Modem: Internal and External: Block diagram and specifications.
- Printer: Dot matrix, Inkjet, Laser: Block diagram and specification

5. Power Supplies

- Block diagram and working of SMPS.
- Signal description and pin diagram of AT and ATX connectors
- Power supply characteristics: Rated wattage, Efficiency, Regulation, Ripple, Load regulation, line regulation
- Power problems : Blackout, Brownout, surges and spikes
- Symptoms of power problems
- Protection devices : Surge suppressor : working
- UPS : Block diagram, working, Types, Rating

6. Interfaces

- SCSI, SCSI cables and connectors, SCSI drive configuration.
- USB features
- RS232 : (Voltages & 9 pin Signal description)
- Centronics (interface diagram, signals and timing waveform) 6.6 Firewire features

7. Pc Diagnostic, Testing And Maintenance And Tools

- Preventive Maintenance : Active Preventive maintenance, passive preventiv maintenance, periodic maintenance procedure
- Preventive maintenance of peripherals of PCs.
- Fault finding and troubleshooting of the above peripherals
- ESD (Electrostatic discharge), RFI protection
- Working of logic probe, logic purser, current

Reference :

1. Managing & Troubleshooting PCs (*Mike Meyers, Scott Jernigan*) Tata McGraw Hill
2. Bigelow's Troubleshooting, Maintaining & Repairing PCs (*Bigelow*) Tata McGraw Hill
3. The Complete PC Upgrade & Maintenance Guide (*Mark Minasi*) BPB Publication
4. Computer Installation & Servicing (*D. Balasubramanian*) Tata McGraw Hill
5. Upgrading & Repairing PCs (*Scott Mueller*) Pearson Education

Microcontrollers [MIC]
T.Y. Diploma : Sem V
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SYLLABUS

1. Peripheral Devices

- Need of peripheral
- Data Transfer Techniques
 - Serial and Parallel
 - Hand shaking, Polling, Interrupt driven & device driven Microprocessor controlled with DMA (Only concept of DMA; no chip details)
 - Synchronous and Asynchronous
 - Simplex & Duplex
 - Baud rate – Define

2. Programmable I/O Devices

IC 8155

- Block Diagram, pin out, operating modes, Simple I/O programs and Interfacing with 8085 Microprocessor.
- Minimum system configuration of 8085 Microprocessor.

IC 8255

- Block Diagram, pin out, operating modes, Simple I/O programs and Interfacing with 8085 Microprocessor.
- Comparison of 8155 & 8255 peripheral.

3. Interfacing of A to D Converter with 8085 Microprocessor.

- i) Using Handshaking
 - ii) Using interrupts
- Interfacing of D to A Converter with 8085 Microprocessor and pgm for different waveform generation using 8255.
 - Practical Applications using 8085 Microprocessor.
 - For Stepper Motor Control operation
 - For Temperature Control operation.

4. Introduction to Microcontroller

- Comparison of Microprocessor, Microcontroller.
- Evaluation of Microcontroller
- Terminology: - RISC, CISC, VLIW, Harvard and Von Neumann Architectures
- Memory types:- EEPROM and FLASH
- Specification & comparison of 8051, 8751 & 8951.

5. 8051 Microcontroller

- MCS-51 Architecture and details (from intel manual)
- Pin configuration and pin function of 8051.
- Function of Clock, Oscillator, Registers, Register bank mapping, DPTR, Flags, Stack, PC, Ports
- Concept of Data Memory and Program Memory
- Connections of External Memory and timing diagram.
- 8051 Boolean Processors

6. MCS-51 Addressing Modes and Instructions

- 8051 Addressing modes
- 8051 Instruction Set
- Simple Programming (in assembly language)

7. Assembly language programming

- Development systems tools Editor, Assembler, Linker
- Creating various files to run the 8051 program (asm, obj, lst and hex files)
- 8051 Data Types and Directives (DB, ORG, EQU, END etc.)
- Software Simulators of 8051

8. MCS-51 Timers/Counters, Interrupts and Serial Communication

- Study of Timer SFR's (TMOD, TCON, TLX, THX)
- Timer modes of 8051 and programming of 8051 timers.
- Generation of time delay.
Power saving options of 8051 (study of PCON)

Reference

1. Microcontrollers: Theory & Applications (*Deshmukh*) Tata McGraw-Hill
2. Programming & Customizing 8051 Microcontroller (*Predko*) Tata McGraw-Hill

Digital Communication [DCO]

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SYLLABUS

1. Introduction of Digital Communication

- Basic digital communication system, block diagram
- Channel capacity-definition, Hartley's law, Shannon-Hartley theorem, Channel capacity equation, channel noise and its effect, entropy
- Advantages and disadvantages of digital communication

2. Pulse Communication

- Introduction, comparison with Continuous Wave Modulation, advantages
- Sampling theorem, Nyquist rate, aliasing, natural & flat top sampling.
- PAM, PWM, PPM definition, generation, block diagram, waveform analysis, and their comparison.
- Pulse code modulation- block diagram of PCM transmitter & receiver, sampling quantization, quantization error, companding, inter symbol interference
- Delta modulation- block diagram of DM, slope overload, granular noise.
- ADM, DPCM, block diagram and its working.

3. Digital Modulation Techniques

- ASK, FSK, PSK definition & waveforms, their transmitter and receiver block diagram and working.
- M-ary encoding.
- QPSK, QAM, DPSK block diagram of transmitter and receiver and working.
- Bandwidth for each modulation technique and their comparison.

4. Coding methods and Error control

- Baud rate, Bit rate.
- Line coding - unipolar, bipolar - NRZ, RZ, Manchester
- Source coding, ASCII, EBCDIC and baudot code.
- Channel coding, Error, Causes of error and its effects, error detection & correction using parity, Hamming code & simple numerical.

5. Multiplexing and Multiple Access

- Need of Multiplexing, TDM, FDM definition block diagram and their comparison.
- Introduction to WDM.
- Access technique TDMA, FDMA, CDMA (only concepts), advantages of TDMA over FDMA.

6. Spread spectrum modulation (Only Descriptive treatment)

- Introduction, PN Sequence.
- Model of spread spectrum modulation system.
- Direct sequence spread spectrum signal.
- Frequency hop spread spectrum, slow frequency hopping, and fast frequency hopping.
- Application S. S. modulations.

Reference

1. Electronic communication system (*Wayne Tomasi*) Pearson Education
2. Electronics Communication (*Louis E. Frenzl*) Tata McGraw Hill
3. Communication System (*Roddy Collen*) Prentice Hall of India
4. Digital Communication (*Amitabha Bhattacharya*) Tata McGraw Hill
5. Digital & Analog Communication (*K. Sam. & Shanmugar*) Jhon wiley & sons
6. Digital Communication Fundamentals & Applications (B. Sklar) Pearson Education
7. Digital Communication (*Siman Haykin*) Jhon wiley & sons
8. Digital Communication (*J.S. Chitode*) Technical Publication, Pune
9. Data Communication Networking (*Fronuzen*) Tata Mc-graw Hill

Industrial Electronics [IEL]

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SYLLABUS

1. Power electronics

- Introduction to power electronics.
- Power transistor: Structure of vertical power transistor, I- V characteristics of power transistors, second breakdown, SOA: Safe operating Area.

2. Thyristor family devices

- Brief introduction to Thyristor family devices: TRIAC, SUS, SCS, SBS, LASCR, PUT, GTO.
- Construction, Symbol, working and static V/I characteristics of UJT, PUT, SCR, Diac, Triac, IGBT, MOS controlled thyristors, GTO. The two transistor analogy of SCR.

3. Turn ON and Turn OFF methods of Thyristor

- Introduction to Turn ON and Turn OFF methods of Thyristor.
- Turn on methods - Forward Voltage triggering, Gate triggering, dv/dt triggering, thermal triggering of Thyristor.
- Gate trigger circuits - General block diagram of a thyristor gate trigger circuit, Resistance firing circuit, Resistance Capacitance firing circuit, Resistor Capacitor full wave trigger circuit. SCR triggering using UJT, PUT. Synchronised UJT triggering.
- Thyristor Turn OFF methods - Class A, B, C, D, E, F.
- Introduction to chopper
 - Classification and brief working of step and step down chopper

4. Polyphase Rectifiers

- Need and Use of Polyphase Rectifiers.
- Circuit diagram and waveforms of
 - Three phase half wave Delta - Wye rectifier
 - Six phase star half wave rectifier
 - Three phase Delta - Wye Bridge Rectifier

5. Phase controlled Rectifiers Circuit diagram and waveforms of:

- Single phase half wave controlled rectifier (one - quadrant) with R, RL load. Effect of free wheeling diode.
- Single phase full wave controlled rectifier (two – quadrant converters)
 - Midpoint converters (M 2 connection) R, RL load. Effect of free wheeling diode.
 - Bridge configurations (B 2 connection)
 - Fully controlled bridge circuit with inductive load (R L load)
 - Rectifying mode

- Inverting mode
- Single Phase half controlled Bridge rectifier
 - i) Half controlled bridge rectifier with Resistive load
 - ii) Half controlled bridge rectifier with R L load (No mathematical derivations)
- Introduction and classification of inverter
 - Working principal and operation of series, parallel inverter

Reference

1. Power Electronics (*M D Singh & K B Khan Chandani*) Tata McGraw-Hill
2. Power Electronics Circuits Devices and Applications (*Muhammad H. Rashid*) Prentice Hall of India
3. Industrial and Power Electronics (*G K Mithal & Dr Manisha Gupta*) Khanna Publishers
4. Industrial Electronics (*S N Biswas*) Dhanpat Rai and Sons
5. Industrial and Power Electronics (*Harish C. Rai*) Umesh Publications

Audio Video Engineering [AVE]

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SYLLABUS

1. Hi Fi Audio Amplifier

- Introduction to Amplifiers: Mono, Stereo, Public Address.
- Difference between stereo amplifier & Mono amplifier.
- Block diagram of Hi Fi amplifier & explanation
- Controls available on it & its function & other facility available on it like (Mic in, Aux.in, earphone in)
- Graphic equalizer concept, circuit diagram and operation. (5 Point Circuit diagram)
- Dolby NR recording system
- Types of speaker - its comparison only I) woofer, II) Mid-range, III) Tweeter
- Cross over network circuit & its function

2. CD player

- CD - material used, size
- Block diagram of CD player & explanation.
- Principle & working of detection used in CD player.
- Component used for CD mechanism. I) CD pick-up assembly, II) gear system, III) drive motors, IV) CD lens.
- Function of controls.
- Parts, function of remote control (transmitter unit) & function of receiver used in CD player.
- Advantages of florescent display system used in CD player.

3. TV Fundamentals

- Concept & explanation of following: Aspect ratio, image continuity, interlace scanning, scanning periods - horizontal & vertical, vertical resolution, horizontal resolution.
- Vestigial sideband transmission, bandwidth for Colour signal, brightness, contrast, viewing distance luminance, hue, saturation, compatibility.
- Colour theory, primary colors & secondary colors, Grassman's law, additive Colour mixing subtractive Colour mixing.
- Composite Video Signal explain with waveform: Pedestal height, Blanking pulse, Colour burst, Horizontal sync pulse details, Vertical sync pulse details, Equalizing pulses, CCIR B standards for Colour signal transmission & reception.
- TV channel allocation for band I & band III.

4. TV Transmitters & Receiver

- Audio and Video signal transmission
- Positive and Negative modulation
- Merits and Demerits of Negative modulation
- Introduction to television camera tube (working & principle only)
(a) Vidicon, (b) Plumbicon, (c) Solid State camera based on CCD.
- Color Picture tube (working & principle only)
(a) PIL, (b) Delta gun picture tube.
- Block diagram of monochrome TV transmitter (Function of each block)
- Block diagram of Colour TV transmitter.
- Block diagram of monochrome TV Receiver.

5. Colour TV

- Block Diagram & operation of color TV receiver (PAL D type)
Explain -Yagi Uda Antenna.
Explain block diagram of PAL-D decoder.
- Circuit diagram of chroma signal amplifier, Burst pulse blanking, Colour killer control, Basic Circuit for Separation of U & V signals. ACC Amplifier. Colour signal matrixing, RGB drive amplifiers.
EHT generation: circuit explanation for line output stage using transistor or IC in Colour TV.
Comparisons between NTSC, PAL & SCAM Systems.

6. Cable Television

- Working principle & specification of following components: Dish antenna, LNBC, Multiplexer, Attenuators Connectors (two ways & three ways), Amplifier & cable.
- MATV, CATV & CCTV.
- Design concept for cable TV network.
- Block diagram of dB meter with working principle.
- Direct to Home System (DTH) Introduction & Block Diagram

Reference

1. Television & Radio Engineering (*A.M Dhake*) Tata McGraw-Hill
2. Television Engg and Video System (*R.G Gupta*) Tata McGraw-Hill
3. Audio Video Systems (*R.G Gupta*) Tata McGraw-Hill
4. Modern TV Praticce (*R.R Gulati*) New age International
5. Basic Radio and Television (*S. Sharma*) Tata McGraw-Hill
6. Colour Television Principles and Praticce (*R.R Gulati*) New age International
7. Basic Television and Video System (*Bernard Grob*) Tata McGraw-Hill
8. Mono Chrome and Colour Television (*R.R Gulati*) New age International
9. Modern CD Player Servicing Manual (*Manohar Lotia*) BPB Publication