MAHATMA GANDHI UNIVERSITY

MSc. ELECTRONICS

(2012 ADMISSION ONWARDS)

Semester I Programme Course 1

Model Question Paper

MES 1C1: Electronic Devices and Circuit Design

Time 3 hours Weightage 30

I. Answer any *five* of the following in not less than 50 words (Weight 1 each)

1. What is the virtual ground concept?
2. What are the differences between enhancement mode and depletion mode ?
3. What are the characteristics of Digital IC?
4. Compare the input resistance of the FET and BJT?
5. What is De Morgan's Law?
6. What is meant by Thermal drift of an Op-Amp?
7. Differentiate between Zener and Avalanche breakdown?
8. What are the ideal characteristics of an Op-Amp?

II. Answer any *five* of the following in not less than 100 words (Weight 2 each)

9. Explain multiplier and divider using Op-Amp with its applications?
10. What are the characteristics of JFET?
11. With a neat diagram explain the working of an astable multivibrator?
12. How do we get a notch filter from a band pass filter?
13. Describe any two semiconductor devices that work in the negative resistance region?
14. How can a practical differentiator eliminate the limitations of an ordinary differentiator?
15. Derive an expression for the frequency and the gain for a Wien bridge oscillator?

16. Design a MOD 7 counter?

III. Answer any *three* of the following in not less than 250 words (Weight 5 each)

17. Explain the operating of a BJT work as a switch. Clearly specify the operating regions?

18. Explain the use of FET as a voltage variable resistor with the help of its drain characteristics

19. Explain any two active filters?

20. Draw the circuit of an inverting Schmitt Trigger and explain the working with proper diagrams and transfer curve?

21. Define a combinational system. How it differ from sequential system?

22. Design a 3 bit sequence generator which generates the sequence:

0,3,7,6, 0,3,7,6, 0,3,7,6, 0, 3,7,6,0

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Semester I Programme Course 2

Model Question Paper

MES 1C2: MODERN COMMUNICATION SYSTEMS

Time 3 hours Weightage 30

I. Answer any *five* of the following in not less than 50 words (Weight 1 each)

1. Why modulation is needed?
2. What is Companding?
3. Explain Total Internal Reflection.
4. Explain Group Delay in optical waveguides?
5. Explain WLL.
6. What is Hand-off in mobile communication?
7. What is station keeping in satellite communication?
8. Explain Radar Beacons.

II. Answer any *five* of the following in not less than 100 words (Weight 2 each)

9. Explain with figures generation and detection of Delta modulation.
10. Compare QPSK with DPSK.
11. With diagrams explain fiber classifications.

12. Explain how a cellular telephone call is made?

13. Explain cellular structure and methods for improving coverage and capacity?

14. Explain about satellite orbits.

15. With block diagram explain satellite earth stations.

16. Compare phased array and planner array radars.

III. Answer any *three* of the following in not less than 250 words (Weight 5 each)

17. Explain the modulation and demodulation of PCM with necessary diagrams?

18. Explain with diagrams the characteristics of ASK, FSK and PSK.

19. Explain signal attenuation/losses in fiber optic communication.

20. With diagrams explain multiple access techniques in Mobile communication.

21. Explain Geostationary Satellite Communication. What is satellite Path/Link budget?

22. With necessary diagrams explain basic Radar System. Discuss the radar performance factors.

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Semester I Programme Course 3

Model Question Paper

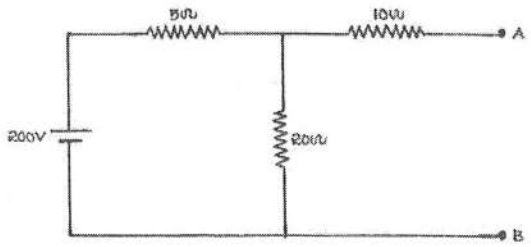
MES 1C3: ADVANCED NETWORKS AND SYSTEMS

Time 3 hours

Weightage 30

I. Answer any *five* of the following in not less than 50 words (Weight 1 each)

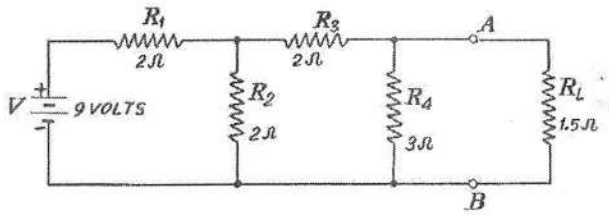
1. State Maximum power transfer theorem.
2. What is positive real function?
3. Define Dependent and Independent sources?
4. Determine thevenin's resistance of the following circuit.



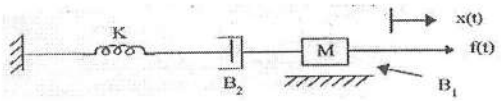
5. What is the time constant for RL series circuit with R=20Ω and L=40mH?
6. State relation between transfer function and impulse response?
7. Draw the pole zero diagram for the given network function V(s)=4(s+2)s/(s+1)(s+3)
8. Determine the Laplace transform of the function $f(t)=6e^{-t}+14$

II. Answer any *five* of the following in not less than 100 words (Weight 2 each)

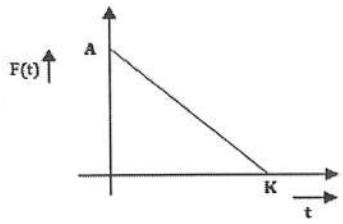
9. Using Norton's theorem finds the current in the load resister RL in the network shown below.



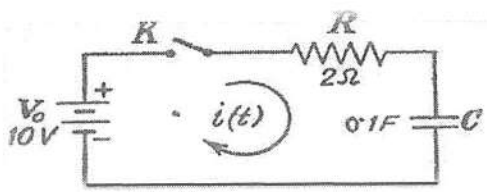
10. Find the transfer function of the mechanical system shown below.



11. Find the Fourier transform of the signal shown in figure.



12. In the given circuit, switch k is closed at time t=0. Obtain particular solution for current i(t) after the switch is closed. Assume that there is no charge the capacitor C before switching.



13. Test whether the polynomial $P(s)=s^4+s^3+4s^2+2s+3$ is Hurwitz.

14. Obtain RL realization of the function $Z(s)=2(s+1)(s+3)/(s+2)(s+6)$

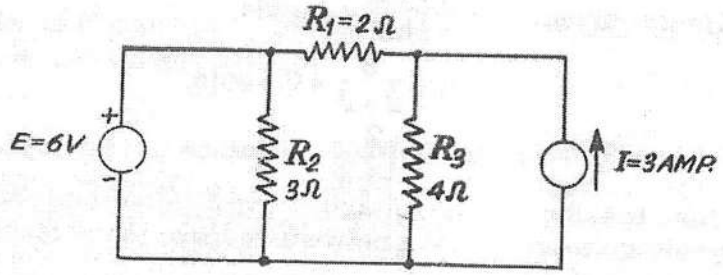
15. Define following terms.

    (a).Linearity
    (b).Stability
    (c).Causality
    (d).Time invariance

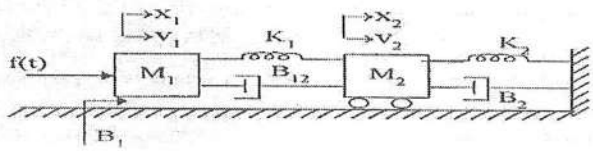
III. Answer any *three* of the following in not less than 250 words (Weight 5 each)

16. Find Inverse Laplace transform of $2s/(s^2+4)(s+5)$

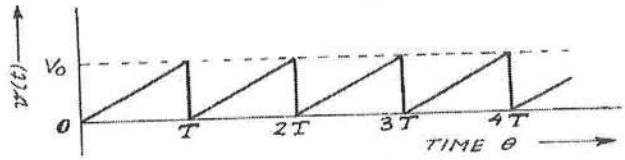
17. In the given network ,making use of super position theorem determine the currents in the resistors R1,R2and R3 and also the currents in the voltage source E



18. Write the differential equations governing the mechanical system shown in figure and draw the force-voltage analogous circuit and verify by writing mesh and node equations.

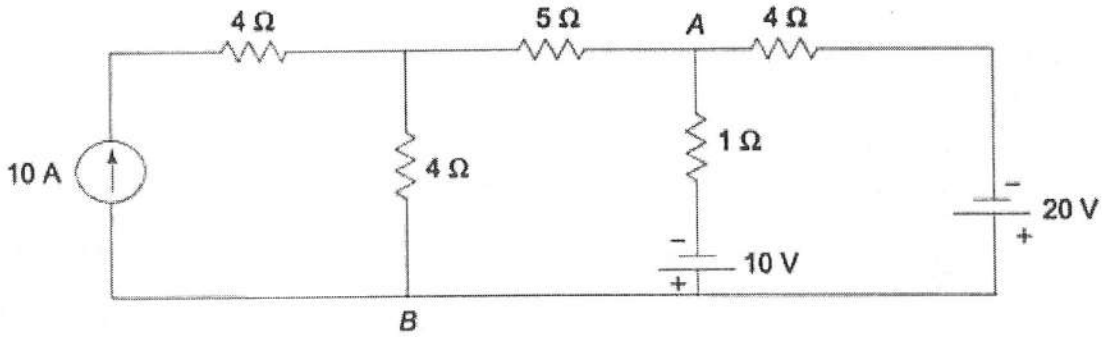


19. The following figure shows a sweep voltage of periodic time T and amplitude Vo. Find its Laplace transform

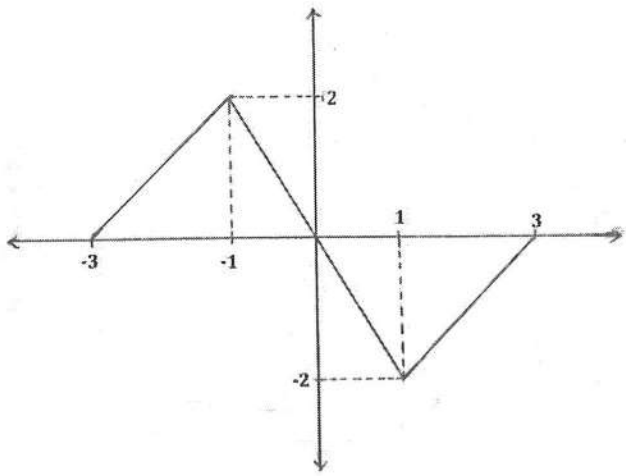


20. Find the two Foster realization of $Z(s)=4(s^2+1)(s^2+16)/(s^2+4)$

21. Find the voltage between A and B of the circuit shown in figure by mesh analysis.



22. Find the Fourier transform of the function shown in figure:



MAHATMA GANDHI UNIVERSITY

MSc. ELECTRONICS

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Semester I Programme Course 4

Model Question Paper

MES 1C4: MEMS AND POWER ELECTRONICS

Time 3 hours Weightage 30

I. Answer any *five* of the following in not less than 50 words (Weight 1 each)

1. Explain the components in micro system? Draw the block diagram?
2. What are most obvious distinctions between microelectronics and micro systems?
3. Explain the doping of semiconductor?
4. What is mean by miniaturization?
5. Draw a triggering circuit for TRIAC? Explain its working?
6. Discuss turn-on and turn-off of an SCR?
7. Give the principle of ON-OFF Control of ac voltage controller?
8. Write a short note on

   a) DIAC b) Inverter

II. Answer any *five* of the following in not less than 100 words (Weight 2 each)

9. Given the difference between MEMS and integrated circuit (IC)?
10. Explain scaling laws for electrical design?

11. Write short note on

    a) ion implantation b) diffusion c) oxidation

12. Explain PVD process?

13. What is IGBT? Explain in details?

14. What is a commutation technique? Explain any three?

15. Explain buk boost regulator? What are the advantages and disadvantages?

16. Explain the operation of single phase cyclo converter?

III. Answer any *three* of the following in not less than 250 words (Weight 5 each)

17. Explain MEMS and Microsystem products?

18. Briefly explain application of MEMS?

19. Explain LIGA process in details?

20. Explain UJT and relaxation oscillator with help of diagram?

21. What are the various types principles used ac voltage controller? Explain single phase Bi-directional controllers with resistive loads?

22. What is a switch mode regulator? Briefly explain buck regulator and boost regulator?

Semester II

MES 2C1 – DSP AND APPLICATIONS

MES 2C2 - MICROCONTROLLERS AND EMBEDDED SYSTEM

MES 2C3 - ROBOTICS AND MECHATRONICS

MES 2C4 - VLSI DESIGN AND ANALYSIS

MES 2P5 - MICROCONTROLLER AND SIGNAL PROCESSING LAB

MES 2C1 Digital Signal Processing and Applications

Module 1

Introduction to signals, Classification of signals, Discrete time systems, Digital signal Processor systems, Advantages and limitations of Digital Signal Processing systems, Operations of Signals

Book: 1

Module 2

Z transform definition, properties, inverse Z transform –Partial fraction, convolution method, Solution different equations using one sided Z transform.

Book: 1

Module 3

Image Processing, Image representation, Stages of Image Processing, Application of Image Processing, Colour Image. RGB, YUV, Image Enhancement , DCT, DST, Image compression standard-JPEG, JPEG2000, Image processing software-an overview

Book: 3, 4

Module 4

Video coding, motion estimation, Search for Motion Vectors, video coding standards, MPEG 1 standards, H.261 standards, H.264 standards

Book: 5

Reference

1. Ramesh Babu , Digital Signal Processing-, Fourth edition, Scitech Publications(India),Chennai
2. Nagoorkani , Digital Signal processing, McGraw-Hill Education

3. K. Sayood, Introduction to Data Compression", Harcourt India Pvt. Ltd. & Morgan Kautmann Publishers, 1996.
4. S Jayaraman , Digital Image Processing. Tata McGraw-Hill Education
5. Z.Li and M. S Drew,"Fundamentals of Multimedia", Pearson Education (Asia) Pte.Ltd.
6. Mark Nelson, Data Compression book, B.P.B Publishers Newdelhi, 1998.
7. Jan Vozer, Video compression for Multimedia, Newyork, 1995.
8. Digital signal processing - Principles, algorithms and application – John C, Proakis - PHI.

MES 2C2 Microcontrollers and Embedded system

Module 1

Introduction to Embedded systems –Microcontroller and Embedded Processor –Introduction to 8051-Archtecture,Hardware-Oscillator & clock program C-Data pointer-Registers-Memory Organisations-Program Memory- Data Memory – Input /Output Ports- External Memory – Counter –Timer-Serial Data-Input Output Interrupts

Book: 1

Module 2

8051 Assembly language programming- Structure of assembly language-Assembling & running an 8051 –Addressing Modes – Accessing memory using various addressing modes – Instruction set - Arithmetic Operations & programs-Logical Operations and Programs - Jump & Call instructions and Programs- I/O port programs- Single bit call instructions & Programs -Timer and counter & programs.

Book: 1

Module 3

UART- Serial Protocols: 12C bus, TWI, SPI, CAN bus - Wireless protocols: IrdA - RS-232 – Input Capturing and Output Compare – Pulse Width Modulation – Wave Generation – Watch Dog Timers – JTAG

Book: 4, 5

Module 4

AVR Microcontroller – AVR Family - AVR RISC Microcontroller Architecture (ATMega-32) – ALU & Registers – Memory Access & Instruction Execution – Program & Data Addressing Modes – AVR Instruction Set – Serial Communication: UART, SPI, I2C, TWI – Timers – PWM – Watch Dog Timers – Interrupts

Book: 5, 6

Module 5

Overview of PIC microcontrollers - PIC Architecture and assembly language programming. - Comparison of 8051, PIC & AVR Microcontrollers – Introduction to MPLAB simulator – AVR Simulator: AVR Studio – Programming the AVRs – Introduction to AVR C-Programming

Book: 2, 5, 6

Reference

1.Muhamed Ali Mazidi, Rolin D Mckinlay, The 8051 Micrcontroller and embedded systems, Second editon, Pearson Education. Inc

2. Martin Bater, PIC microcontroller, an introduction to microelectronics , 3 rd Edition

4. Frank Vahid and Tony Givargis,Wiley Embedded system design :A unified hardware / software Introduction

5. Dhananjay V. Gadre, Programming and Customizing the AVR Microcontroller, McGraw Hill

6. Muhamed Ali Mazidi, Sarmad Naimi, Sepehr Naimi, The AVR Microcontroller & Embedded systems, Prentice Hall

MES 2C3 Robotics and Mechatronics

Module 1

Introduction: Definitions. Robot classification-Cartesian, Cylindrical, Spherical Work envelope, Repeatability, Precision, Accuracy, Types of joints, Prismatic, Revolute, Ball and Socket, Degree of Freedom, Joint Variables

Book: 1

Module 2

Sensors and actuators: Sensors, Position Sensors-Potentiometric, Velocity and Speed measurements, Proximity Sensors, Touch and slip sensors, Force and torque sensors, Actuators-Hydraulic and Pneumatic,DC motor and Stepper motors

Book: 2,3

Module 3

Robot Programming: Teach In, Teach Through, High level Languages- robot talk, Comparison of Teaching and Programming methods, Software and speed up. Industrial applications: Loading and Unloading, Die Casting, Spot and Arc welding, Assembly applications, Selection of Robots

Book: 5, 2, 6

Module 4

Introduction to mechatronics-systems-control systems-history-structure of robotics and mechatronics projects-systems-measurement systems control systems-microprocessor-based controllers-response of systems-themechatronics approach

Book:8

REFERENCE

1. Schilling, Robert J." Fundamentals of Robotics" PHI, 1996
2. klafter,richardd,"robotic engineering"'PHI,1996
3. Fu,Gonzalez,Lee"Robotics:Control,Sensing,vision and intelligence"Mcgraw hill
4. Moshe Shoham,"a text book of robotics-basic concept",koganpage,london-1982
5. Groover, Weiss, Nagel, and Odrey"industrial robotics – technology,programming&applications"Mcgraw hill
6. R k mittal, i j nagrath "robotics and control ",McGraw hill
7. Devdasshetty, richard a. kolk, -mechatronics system design.- pws publishing company, 1997
8. Bradley, d.dawson, n.c.burd and a.j. loader. Mechatronics: electronics in productsand processes, chapman and hall. London, 1991.
9. Bolton, -Mechatronics - Electronic Control systems in Mechanical and Electrical Engineering-, 2nd Edition, Addison Wesley Longman Ltd... 1999.
10. Devdasshetty, Richard A. Kolk, -Mechatronics System Design.- PWS Publishing company, 1997
11. Brian Morriss, Automated Manufacturing Systems - Actuators,Controls, Sensors and Robotics, Me Graw Hill International Edition, 1995.

MES 2C4 VLSI DESIGN AND ANALYSIS

Module 1. Introduction to MOS Technology

Basic MOS Transistors--Enhancement Mode Transistor action—Depletion Mode Transistor Action—nMOS Fabrication--Silicon Wafer Preparation—Summary of an nMOS process—Basic CMOS Technology—The p-well Process—The n-well Process—The Twin-Tub Process—SOI Process—BiCMOS Technology-- Moor's Law

Module 2. Basic Electrical Properties of MOS and CMOS Circuits

nMOS and pMOS Enhancement Mode Transistors--V-I Characteristics of MOSTransistors—MOS Device Equations—Basic DC Equations--Threshold Voltage—Body Effect—The Pass Transistor—The nMOS Inverter—Pull-Up to Pull-Down Ratio—The CMOS Inverter—DC Characteristics—Switching Characteristics of CMOS Inverter

Module 3. MOS Circuit Design Process

Why Design Rules—MOS Layers—Stick Diagrams—nMOS Design Styles—CMOS Design Styles—Design Rules and Layout—Scaling of MOS Circuits—Scaling Models and Scaling Factors—Scaling Factors for Device Parameters—Limitations of Scaling

Module 4. Subsystem Design and Layout

Architectural Issues—Switch Logic:-Pass Transistors and Transmission Gates—Gate Logic:-The Inverter,Two-input nMOS and CMOS Nand & Nor Gates—Examples of Structured Design(Combinational Logic):-Parity Generator,Multipluxers,General Logic Function Block—Progammable Logic Array—Clocked Sequential Circuits:-Two-phase clocking,Charge Storage,Dynamic Register Element,Dynamic Shift Register—Design of 4*4 Barrel Shifter

Module 5.Ultra-fast VLSI Technology and Introduction to VHDL

Ultra-fast Systems—Submicron CMOS Technology—GaAs VLSI Technology—Technology Development—Comparison between Si and GaAs Technology

About VHDL—History—Capabilities—Hardware Abstraction—Basic Terminology—Entity Declaration—Architecture Body—VHDL vs.Verilog—XILINX

Text Books

1.Basic VLSI Design- -Douglas A.Pucknell-Third Edition-PHI Publication**(Module-1,2,3,4,5)**

2.Principles of VLSI Design-Neil H.E.Weste&Kamaran-Second Edition-Pearson Education**(Module-1,2)**

3.A VHDL Primer-J.Bhasker-Third Edition-Pearson Education**(Module-5)**

Reference Text Books

1.VLSI Design-Albert Raj&T.Latha-PHI Publication

2.Integrated Circuit-K.R.Botkar-Khanna Publishers

3.Modern VLSI Design-Wayne Woolf—Third Edition—PHI Publication

4.Introduction to VLSI Design—CarverMead&Conway-BS Publications

MAHATMA GANDHI UNIVERSITY

MSc. ELECTRONICS

(2012 ADMISSION ONWARDS)

Semester II Programme Course 1

Model Question Paper

MES 2C1: Digital Signal Processing and Applications

Time 3 hours Weightage 30

I. Answer any *five* of the following in not less than 50 words (Weight 1 each)

1 Distinguish between Continuous time system and Discrete time system?

2 What is quantization of an image?

3 Give any two properties of Z-transform?

4 Explain intraframe coded pictures?

5 What is motion estimation?

6 What is a digital image? Given the classification of digital images?

7 Define causal and non-causal systems?

8 What is Region-of-interest (ROI) in JPEG-2000?

II. Answer any *five* of the following in not less than 100 words (Weight 2 each)

9 Explain picture types in MPEG-1?

10 Explain bit stream structure of H.261?

11 Explain the applications of digital image processing?

12 Write a short note on JPEG image compression standard?

13. What are the advantages of digital signal processing?

14. Determine the Z-transform and ROC of the signals

(i) $x(n)=a^n\ u(n)$

(ii) $x(n)=-b^n\ u(-n-1)$

15. Find the inverse Z-transform of

$X(Z)=(1+3Z^{-1})/(1+3Z^{-1}+2Z^{-2})$

16. What are the advantages of H.264 over H.261?

III. Answer any *three* of the following in not less than 250 words (Weight 5 each)

17. Explain H.264 in details with the help of neat block diagram?

18. Explain JPEG-2000 still image compression standard?

19. Explain various steps in digital image processing?

20. Find the inverse Z-transform of $X(Z)=1/(1-3Z^{-1}+2Z^{-2})$ using convolution method?

21. Find the Z-transform & ROC of the following functions

(i) $x(n)=\{1,2,3,4\}$ (↑ under 1)

(ii) $x(n)=\{4,3,2,1\}$ (↑ under 2)

(iii) $x(n)=\{2,-1,3,2,1,0,2,3,-1\}$ (↑ under 1)

22. Find the impulse response of the following systems described by difference equations

(i) $y(n)-3y(n-1)-4y(n-2)=x(n)+2x(n-1)$

(ii) $y(n)=y(n-1)+y(n-2)+x(n-1)$

Using Z-transform

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(2012 ADMISSION ONWARDS)

Semester II Programme Course 2

Model Question Paper

MES 2C2: MICROCONTROLLERS AND EMBEDDED SYSTEM

Time 3 hours Weightage 30

I. Answer any *five* of the following in not less than 50 words (Weight 1 each)

1. What are the features of 8051?
2. Describe the difference between the timer and counter operation of 8051 microcontroller?
3. State four instructions related with external memory?
4. Explain the different classifications of AVR?
5. Define the term RISC and CISC?
6. What is TWI? Explain the functioning of TWI in AVR?
7. Draw the format of TMOD register and write the function of each bit in 8051?
8. Explain the advantages of in AVR at mega 32 over 8051?

II. Answer any *five* of the following in not less than 100 words (Weight 2 each)

9. Draw and explain the block diagram of 8051?
10. Describe function PSEN, EA, XTAL1 & XTAL2 pins of 8051 microcontroller?
11. Compare data memory & program memory w.r.t. 8051 microcontroller?
12. Explain I^2C bus with help of a block diagram?

13. Compare the features of AVR and PIC?

14. Explain Watch Dog Timers in in AVR?

15. Explain working of RS-232 with help of block diagram?

16. Explain the theory of operation of PWM in AVRs?

III. Answer any *three* of the following in not less than 250 words (Weight 5 each)

17. Briefly explain what are SFRs in 8051?

18. Explain Block diagram and Architecture of AVR?

19. Explain the normal and alternate functioning of IO ports in AVR?

20. Explain CAN bus in details?

21. Explain the different addressing modes with examples from AVR and 8051?

22. Explain SPI bus with help of block diagram? Explain the functioning of SPI in AVR?

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Semester II Programme Course I

Model Question Paper

MES 2C3: Robotics and Mechatronics

Time 3 hours

maximum weight 30

I. Answer any *five* of the following in not less than 50 words (Weight 1

1) Define robot.

2) What do you mean by compliance?

3) Name different types of robot joints.

4) What are the different classifications of robots based on work envelope?

5) What are the different modes of operation of a stepper motor?

6) Explain the term "World Modeling".

7) What are sensors?

8) Define the term "Mechatronics"

(5x1 = 5 weight)

II. Answer any *five* of the following in not less than 100 words (W~~e~~

(weight 2 each)

9) Explain the process die casting with neat diagram

10 - - -

11 - - - -

12 - - - -

13) What do you mean by a HLL? Explain generations of robot language.

14) Explain microprocessor based controllers.

15) Give an example of loading-unloading application with necessary figures.

16) What are proximity sensors? Explain any two proximity sensors.

(5×2 = 10 weight)

III. Answer any *three* of the following in not less than 250 words (Weight

(weight 5 each)

17) Give any 2 industrial applications of robot.

18) Explain the mechatronics approach

19) Explain:

a) Teach – in

b) Spot welding

c) Peg hole assembly errors

d) Potentiometers

20) Explain robot teaching and programming methods.

21) Explain any 2 types of sensors.

22) Explain actuators in detail.

(3×5 = 15 weight)

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Semester II Programme Course 1

Model Question Paper

MES 2C4: VLSI DESIGN AND ANALYSIS

Time 3 hours Weightage 30

I. Answer any *five* of the following in not less than 50 words (Weight 1 each)

1. Compare nMOS&CMOS technologies
2. What is Pinch off condition?
3. Explain Moor's Law.
4. Explain Pass Transistor.
5. Explain Stick Diagram.
6. Explain the design rules for Contact Cuts
7. Explain Two-phase clocking
8. What is Verilog?

II. Answer any *five* of the following in not less than 100 words (Weight 2 each)

9. Compare Enhancement and Depletion mode transistors.
10. With diagram explain Twin-tub process.
11. Explain Body-effect.
12. With diagram explain the working of nMOS inverter.

13. Explain the scaling factors for device parameters.

14. With diagrams explain 2-input NAND gate. Also draw its stick diagram.

15. Implement a Four-way Multiplexer.

16. What is VHDL? Discuss the hardware abstraction.

III. Answer any *three* of the following in not less than 250 words (Weight 5 each)

17. With necessary diagrams explain the working of nMOS enhancement mode transistor. Derive the expression for the drain current in all regions of operations.

18. Explain the n-well CMOS process.

19. With diagrams explain the CMOS inverter and its transfer characteristics. Give the expression for drain current in each regions of operation.

20. What is Threshold voltage? Explain Lambda-based design rules.

21. Implement & Explain

    (a). Dynamic Register Element

    (b). 4*4 Barrel Shifter

22. List the major capabilities of VHDL. Compare CMOS, Bipolar & GaAs Technologies.

Syllabus III sem IV sem Msc Electronics

(1)

CURRICULUM DESIGN ABSTRACT

Semester III

MES 3C1-OPTICAL COMMUNICATION TECHNIQUES

MES 3C2-PROGRAMMING IN C++

MES 3C3-DATA COMMUNICATION AND INTERNET TECHNOLOGY

MES 3C4-CONTROL SYSTEMS

MES 3P5-C++ PROGRAMMING LAB

MES 3C1 OPTICAL FIBER COMMUNICATION SYSTEMS Techniques.

Total Hours: 72 **Total Credits: 4**

OBJECTIVES

- To get a basic understanding of fundamental principles of Optical Fiber Technology
- To understand different Multiplexing Techniques
- Should able to know different Testing Equipments

Module 1. Introduction, Fibre Structures & Waveguiding 18Hrs.

Overview of Optical Fiber Communications—Advantages of Optical Fibers—Optical Spectral Bands—Key Elements of Optical Fiber System—Basic Optical Laws and Definitions—Optical fiber Modes and Configurations:Fiber Types,Rays&Modes,Step Index Fiber Structure,Wave Representation—Mode Theory for Circular Waveguides:Overview of Modes,Maxwell's Equations,Waveduide Equations,Wave equations for Step-Index Fibers—Single Mode Fibers—Graded-Index Fibre Structure—Fiber Materials—Fiber Fabrication--Fiber Optic Cables

Module 2. Signal Degradation in Optical Fibers &Optical Sources 18 Hrs.

Attenuation:Attenuation Units,Absorption,Scattering Losses,Bending Losses,Core and Cladding Losses—Signal Distortion in Fibers:Intramodal Dispersion,Group Delay,Material Dispersion,Waveguide Dispersion,Polarization-Mode Dispersion

Light Emitting Diodes(LEDs):LED Structure,Light Source Materials—Laser Diodes:Laser Diode Modes and Threshold Conditions,Laser Diode Rate Equations,Laser Diode Structure and radiation Patterns,Single Mode Lasers—Reliability Considerations

Module 3. Power Launcing , Coupling & Photodetectors 18Hrs.

Power Launching—Source to Fiber Power Launching:Source Output Patterns—Lensing Scheme for Coupling Improvement:Nonimaging Microsphere,Laser-Diode to Fiber Coupling—Fiber-to-Fiber Joints:Mechanical Misalignment,Fiber End-Face Prepration—Fiber Splicing:Splicing Techniques—Optical Fiber Connectors:Connector Types

Photo Detectors—Physical Principles of Photodiodes:The *pin* Photo-detector,Avalanche Photodiode—Detector Response Time:Depletion Layer Photocurrent,Response Time—Comparisons of Photodetectors—Solar Cells

Module 4.Optical Network,Measurement&Monitoring Techniques 18Hrs.

Optical Networks—Network Concepts:Network Terminology,Network Categories,Network Layers,Optical layers—Network Topologies—WDM&Operational Principles--SONET/SDH:Transmission Formats and Speeds—High Speed Light Wave Links—Optical Add/Drop Multipluxing;OADM Configurations—Optical Switching:Optical Crossconnect

Performance Measurement and Monitoring—Basic Test Equipment:Test Support Lasers,Optical Spectrum Analyser,Multiple Function Testers,Optical Power Attenuatirs,Conformance AnalyserVisual Fault Indicator—Optical Power Measurements:Definition of Optical Power,Optical Power Meters—Eye Diagram Tests—Optical Time-Domain Reflectometer(OTDR).

Text Book

1. Optical Fiber Communication—Gerd Keiser—Fourth Edition—Mc Graw Hill Publication **(Module 1,2,3&4)**

Reference Text Books

1. Optical Fiber Communications—John M.Senior—Third Edition—Pearson Education

2. Semiconductor Optoelectronics Sevices—Pallb Bhattacharya—Secod Edition—PHI Publication

3. Electronics Communication Systems--Wayne Thomasi,--5th Edition--Pearson Publication.

MES 3C2 PROGRAMMING IN C++

HOURS : 72 TOTAL CREDIT : 4

Objective: To acquire knowledge on Object-Oriented Programming concepts using C++.

MODULE I **16 hrs**

Introduction to object oriented concepts, C++ programming basics, loops and decisions, structures, functions, objects and classes, constructors, objects as function arguments, structures and classes.

MODULE II **14 hrs**

Arrays, arrays as class member data, arrays of objects, strings, strings as class members, operator overloading, over loading unary and binary operator, data conversion.

MODULE III **10hrs**

Inheritance: Derived class and base class, derived class constructors, class hierarchies, private and public hierarchies, levels of inheritance, multiple inheritance, classes within classes.

MODULE IV **16hrs**

Pointers: Memory management, new and delete, pointers to objects, pointers to pointers, virtual functions,friend functions, static functions, assignment and copy initialization, the this pointer, Polymorphism.

MODULE V **16hrs**

Files and Streams: stream classes, disk file I/O with streams - string I/O, character I/O, object I/O, file pointers, command line arguments, Template and Exception handling.

Text book:

Object Oriented Programming in Microsoft C++, Robert Lafore, 3rd edition, Pearson publication.

References:

A C++ Primer, Stanely B Hippman
The C++ Programming Language, BjarneStroustrup
Teach yourself C++

MES 3C3 DATA COMMUNICATION AND INTERNET TECHNOLOGY

Total Hours:72 Total Credits:4

Objective:
To get a knowledge of Data Communication Techniques and Concept of Internet Technology.

MODULE-1 Data Communication System **18 Hrs.**

Basic Model of Data Communication System–Components- Data Representation-Data Flow—Networks-Criteria-Physical Structures—Categories of Networks-Internetwork—The Internet—Protocols and Standards—Network Models—Layered Tasks—The OSI Model—Layers in the OSI Model—Data & Signals—Analog&Digital--Digital Signals-Bit rate-Bit Length-Transmission of Digital Signals—Transmission Impairment—Data Rate Limits—Performance--Digital Transmission—Digital-to-Digital Conversion—Line Coding Schemes—Transmission Modes(Parrallel&Serial Transmission).

MODULE-2 Multiplexing and Switching **18 Hrs.**

Multipluxing—FDM-WDM-Synchronous Time-Division Multipluxing-Statistical Time Division Multipluxing—Spread Spectrum—Transmission Media—Guided Media—Unguided media:Wireless—Switching—Circuit Switched Networks—Datagram Networks—Virtual Circuit Networks—Structure of a Switch:-Circuit&Packet Switches—Telephone Network—Dial-up Modems—Modem Standards--Digital Subscriber Line(DSL)—Cable TV Networks—Cable TV for Data Transfer--ISDN.

MODULE-3 Error Control, Data Link Control & Multiple Access **18 Hrs**

Error Detection and Correction—Types of Errors—Block Coding—Error detection&Correction—Cyclic Codes—CRC—Checksum--Data Link Control—Framing—Flow and Error Control—Protocols—Noiseless Channels-Simplest Protocol-Stop and Wait Protocol—Noisy Channels-Stop and Wait ARQ--Go-back-*N* ARQ—Selective Repeat ARQ—Piggybacking—HDLC—Point-to-Point Protocol(PPP)—Multiple Access—Random Access-ALOHA (Pure &Slotted)--CSMA--CSMA/CD—Controlled Access-Reservation-Polling-Token Passing—Channelization-FDMA-TDMA-CDMA.

MODULE-4 LANs and Internetworking **18 Hrs**

Wired LANs:Ethernet—IEEE Standards—Standard Ethernet—Wireless LANs—IEEE 802.11—Bluetooth—LAN connecting Devices—Hubs-Repeaters-Bridges-Two Layer Switches-Routers--Gateway—Backbone Networks—Virtual Circuit Networks--Frame Relay—ATM

Internetwork Protocol (IP)--Internetworking—IPv4—Process to Process Delivery—User Datagram Protocol (UDP)—UDP Operation-Use of UDP—TCP/IP—TCP Services-TCP Features-TCP Connection-Domain Name System (DNS)—DNS in the Internet—Telnet—Electronic Mail—SMTP—FTP—World Wide Web (WWW)—HTTP—Network Management System.

Text Book

Data Communications and Networking-- Behrouz A .Forouzan-4th Edition-- TataMcGraw-Hill— **(Module 1,2,3,4)**

Reference Text Books

1.Data and Computer Communications-William Stallings-7th/8th Edition-Pearson Education
2.Computer Networkes --Andrew S.Tanenbaum – Pearson Education
3.Data Communication and Computer Networks--Prakash C.Guptha—PHI Publication
4.Internetworking With TCP/IP--Douglas E.Comer—4th Edition—PHI Publication
5.Electronic Communication System—Wayne Tomasi—5th Edition—Pearson Education

MES 3C4 CONTROL SYSTEMS

Total Hours: 72 Total Credits: 4

Objectives

- To understand the open loop and closed loop systems
- To understand time response and frequency response analysis of control systems
- To understand the compensation technique that can be used to stabilize control systems

Module 1 **15 hrs**

Mathematical Models of Physical Systems

General Schematic Diagram of Control Systems - Open Loop and Closed Loop Systems – Review of Laplace Transform - Concept of Feedback -Transfer Function –Poles and Zeros-Block Diagrams –Block Diagram Reduction- Signal Flow Graph - Mason's Gain Formula - Examples – Control System Modelling – Electrical Analogous of Mechanical Translational Systems.

Module II **14 hrs**

Time Response Analysis

Transient and Steady State Response- Input Test Signals - Time Response Analysis – First Order Systems – Impulse and Step Response Analysis of Second Order Systems –Time Domain Specifications – Steady State Errors —Static Error Coefficients - Generalised Error Coefficients.

Module III **15 hrs**

Stability Analysis

Concepts of Stability –Routh-Hurwitz Criterion, Root Locus Technique, Construction of Root Locus – Frequency Response Analysis- Frequency Domain Specifications - Stability Analysis using Bode plots, Polar plots and NyquistStability Criterion, Gain margin andphasemargin.

Module IV **14 hrs**

Compensation of Control Systems

Realization of Basic Compensators – Phase-lead Compensation - Phase-lag Compensation – Phase-lag-lead Compensation - Design of lag, lead, lag-lead Compensators using Bode plot-

Introduction to P, PI, PD and PID Controllers.

Module V **14 hrs**

StateVariable Analysis

State Space Representation of Systems – Block Diagram for State Equation – Transfer Function Decomposition – Solution of State Equation - Transfer Matrix - Concepts of Controllability and Observability.

TEXT BOOKS:

1. Control Systems Engineering, I.J. Nagrath and M. Gopal, , New Age International Publishers, 2003.
2. Modern Control Engineering, K. Ogata, Pearson Education Asia/ PHI, 4th Edition, 2002.
3. Linear Control Systems, Prof.B.S.Manke, Khanna Publishers.
4. Automatic Control systems, Benjamin C. Kuo, Pearson Education, New Delhi, 2003.
5. Control Systems, A. NagoorKani, First Edition, RBA Publications.

Msc Electronics

MODEL QUESTION PAPER
MSc. (ELECTRONICS) DEGREE (CSS) EXAMINATION
Third Semester
MES·3C 2 PROGRAMMING IN C++

Time : Three Hours Total weight : 30

Part A (Wt : 1)
Answer *any five* questions

1. Distinguish between objects and classes.
2. Explain the special properties of the constructor functions.
3. How are strings manipulated in C++?
4. What is operator overloading? Why is it necessary to over load an operator?
5. What are multiple inheritance and multi- level inheritance?
6. What is a pointer? Give an example.
7. Describe any two methods of opening a file within a C++ program.
8. What is a function template?

Part B (Wt : 2)
Answer *any five* questions

9. What are the various methods for performing a loop in C++? Explain with examples.
10. Discuss the similarities and differences of a structure as compared to an array and class.
11. Write a function that takes one string argument and returns a reversed string.
12. Explain the methods of over loading binary operators.
13. With examples explain friend function and static function.
14. Explain polymorphism with example.
15. Explain exception handling with example.
16. Explain command line arguments.

Part C (Wt : 5)
Answer *any three* questions

17. What is meant by dynamic initialization of objects? Why do we need to do this? How is it achieved?
18. Write a program to find the sum and average of 'N' numbers and arrange them in ascending order.
19. Write a program to illustrate the working of a function that returns an object.
20. Choosing a suitable example write a program to illustrate the use of multiple inheritance.
21. Write a program to illustrate how pointers to a derived object are used.
22. Explain object I/O and file pointers with examples.

MES 3P5 C++ PROGRAMMING LAB

PART I

1. Programs based on class, objects and manipulation of objects using member functions.
2. Programs based on constructors (copy constructor, default constructor).
3. Programs based on friend function, passing objects as arguments to function.
4. Programs based on array of objects.
5. Programs based on function overloading.
6. Programs based on operator overloading (binary & unary).
7. Programs based on inheritance.
8. Programs based on virtual functions.
9. Programs based on manipulators or ios format functions.
10. Programs based on file handling (create a file and display the contents).

*[Any **eight** programs]*

PART II - Programs using the functions in <graphics.h> file.

1. Program to draw lines using line() and linerel().
2. Program to draw a circle using circle().
3. Program to draw an ellipse using ellipse().
4. Program to draw a rectangle using the rectangle().

Use the following functions to modify the above programs:
setcolor(), setbkcolor(), fillellipse(), setfillstyle(), floodfill(), settextstyle() etc.

*[Any **three** programs]*

PART III - Programs for PC interfacing

1. Wave form generation using PC.
2. GPIB interfacing with PC.
3. Interfacing ADC with PC.
4. Interfacing DAC with PC.
5. Interfacing Opto couplers with PC.
6. Control of a motor using PC.
7. Temperature monitoring using PC.

*[Any **four** programs]*

MAHATMA GANDHI UNIVERSITY

M. Sc. (ELECTRONICS) DEGREE (C.S.S.) EXAMINATION

Semester III

(2012 ADMISSION ONWARDS)

Model Question Paper

MES3C1: OPTICAL FIBRE COMMUNICATION TECHNIQUES

Time: 3 hours

Maximum Weight: 30

I. Answer any 5 questions. Answer must be not less than 1 page. (Weight: 1 each).

1. What is mean by Polarization?
2. Explain Single-mode Fibers.
3. What is Group Delay?
4. What is Single-Mode Laser?
5. What is Power Launching in Fibers?
6. Explain Solar Cells.
7. Explain about Network Terminology.
8. What is Optical Spectrum Analyzer?

II. Answer any 5 questions. Answer must be not less than 2 pages. (Weight: 2 each).

9. With figures explain different Fiber Types.
10. Explain the Power Flow in Step-Index Fibers.
11. Explain Signal Distortion in Fibers.
12. Explain Light Emitting Diode with structure.
13. Explain the Lensing Schemes in fibers.
14. Write note on Optical Fiber Connectors.
15. Write a note on Optical Switching.
16. Discuss about Optical Power Measurement.

III. Answer any 3 questions. Answer must be not less than 3 pages. (Weight: 5 each)

17. Explain in detail about the Mode Theory for Circular Waveguides. Explain about different Fiber Materials
18. Explain Graded-index Fiber Structure. What is Photonic Crystal Fibers? Explain the structure of Fiber Optic cable
19. Explain in detail about the losses in Optical Fibers.
20. Explain in detail about Laser diodes. Write a note on Reliability Considerations of Optical Sources.
21. Write note on (a) Fiber Splicing,(b)*pin* Photodetector.(c)Avalanche Photodiodes
22. Write note on:-
    (a).WDM
    (b).SONET/SDH
    (c).OTDR

MAHATMA GANDHI UNIVERSITY

M. Sc. (ELECTRONICS) DEGREE (C.S.S.) EXAMINATION

Semester III

(2012 ADMISSION ONWARDS)

Model Question Paper

MES3C3: DATA COMMUNICATION AND INTERNET TECHNOLOGY

Time: 3 hours Maximum Weight: 30

I. Answer any 5 questions. Answer must be not less than 1 page. (Weight: 1 each).

1. Explain the model of data Communication System.
2. Write a note on Internetwork.
3. What is mean by Latency?
4. Explain Spread Spectrum?
5. What is DSL?
6. What is mean by Checksum?
7. What is mean by Piggybacking?
8. Explain Bluetooth.

II. Answer any 5 questions. Answer must be not less than 2 pages. (Weight: 2 each).

9. With figures explain different Network Topologies.
10. Explain Different Line Coding Schemes in Data Communication.
11. Explain Transmission Media In data Communication.
12. Explain The Telephone Network.
13. Explain Cyclic Redundancy Check.
14. Explain CSMA/CD.
15. What is Ethernet?
16. Discuss about TCP/IP.

III. Answer any 3 questions. Answer must be not less than 3 pages. (Weight: 5 each)

17. With necessary diagrams explain the OSI Model and the Layers.
18. With diagram explain LAN, WAN&MAN. Explain Digital-to-Digital Conversion
19. With necessary diagrams explain different Multiplexing Techniques.
20. Explain Switched Networks with Examples .Explain ISDN.
21. Explain Protocols for noiseless & noisy channels.
22. Write a Note on:-
    (a). ATM
    (b). Electronic Mail
    (c). World Wide Web
    (d). Network Management system

MAHATMA GANDHI UNIVERSITY

M. Sc. (ELECTRONICS) DEGREE (C.S.S.) EXAMINATION

Semester III

(2012 ADMISSION ONWARDS)

Model Question Paper

MES3C4: CONTROL SYSTEMS

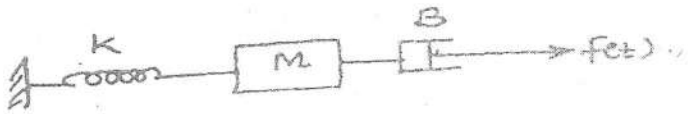
Time: 3 hours Maximum Weight: 30

I. Answer any 5 questions. Answer must be not less than 1 page. (Weight: 1 each).

1. What are the characteristics of closed loop systems?
2. State Mason's gain formula.
3. Define transfer function.
4. Define (i) Linearity (ii) Causality .
5. What are the properties of state transition matrix?
6. Define (i) peak overshoot (ii)steady state error
7. State Nyquist stability criterion.
8. What are the characteristics of PID controller?

II. Answer any 5 questions. Answer must be not less than 2 pages. (Weight: 2 each).

9. Discuss the block diagram reduction rules.
10. What are the properties of LTI systems?
11. Find the generalized error series for the system with $G(s)H(s)=1/(s^2+1)$.
12. Using Routh Hurwitz Criterion, determine the stability of the system described by: $S^4+s^3+s^2+s+1=0$.
13. Where do we use lead compensators?
14. What are the advantages of PID controller?
15. What is the significance of asymptots in the construction of root loci ?
16. Derive the electrical analogy of the mechanical system shown in fig.(1)



III. Answer any 3 questions. Answer must be not less than 3 pages. (Weight: 5 each)

17. Reduce the block diagram in fig. 2 and hence find C(s)/R(s).

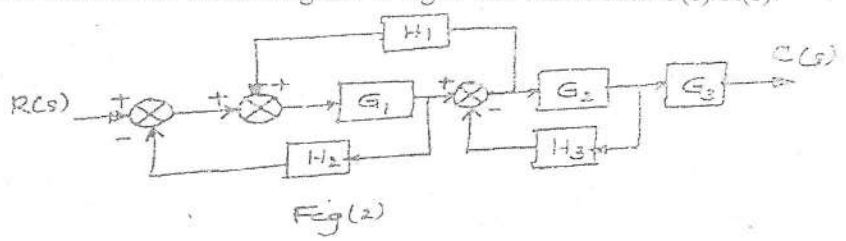


Fig (2)

CURRICULUM DESIGN ABSTRACT

Semester IV

MES 4C1-ADVANCED EMBEDDED SYSTEMS

MES 4P2-VHDL PROGRAMMING LAB

MES 4EA*

MES 4EB*

PROJECT

VIVA-VOCE

MES 4C1 ADVANCED EMBEDDED SYSTEMS

Total Hours: 72 Total Credits:4

Objectives

The aim of this course to provide the student with a detailed understanding of Advanced embedded system on the basis of ARM and VHDL programming. The course covers the details Architecture ARM processor and basic programming concept of VHDL.

Module 1: ARM Architecture **18 hrs**

The ARM Architecture :- The Acorn Risc Machine , Architectural Inheritance, The arm programmers model, Arm devolopement tools. ARM Assembly Language Programming:- data processing ,data transfer, and contol flow instructions , simple programs, ARM Organizationandimplementation.

Module2:ARMProgramming **18hrs**

ARM instruction sets, Architectural Support for High-Level Languages:-data types, floating point data type, Expressions, Conditional statement, loops, functions and procedure, use of memory, Run time environment.

MODULE 3 Basic Concepts in VHDL 14hrs.

Introduction to VHDL—Capabilities—Hardware Abstraction—Basic Terminology—Entity Declaration—Architecture Body—Configuration Declaration-- Package Declaration-- Package Body--Basic Language Elements--Data Objects--Data Types-- Operators

MODULE 4 Modeling and Features in VHDL **22hrs**

Behavioral Modeling--Data Flow Modeling--Structural Modeling--Hardware Modeling Examples: Moore FSM and Mealy FSM.

Text Book:

1.ARM System-on-Chip Architecture, 2/e, steve Furber, Pearson
2.VHDL Primer Third edition by J.Bhaskar, PHI

Reference Book:

1.Embeded systems B.Kanta Rao PHI Publishers , Eastern Economy Edition
2.VHDL for Programming logic, Kevin Skahill, Pearson Education
3.Introductory VHDL : From Simulation to Synthesis, 1/e, Sudhakar Yalamanchili ,Pearson Education
4.VHDL: Basics to Programming ,Gaganpreet Kaur, Pearson Education

MES 4P2 VHDL PROGRAMMING LAB ∝

A. Implementation of Basic Logic Gates

B. Design and simulation of Combinational Logic Circuit using VHDL

1. Adder(Half adder,full adder)
2. 4 bit parallel adder
3. Multiplier
4. Multiplexer and Demultiplexer
5. Encoder and Decoder
6. ALU
7. code converters(gray to binary ,binary to gray)

C. Design and simulation of Sequential logic circuit using VHDL

1. Flip Flop (SR, D, JK, T)
2. Synchronous counters
3. Asynchronous counters
4. Barrel shifter (4*4)
5. Shiftregisters (SISO,SIPO,PISO,PIPO)
6. Modeling of Moore FSM AND mealy FSM
7. Design various counters (decade, mode-12 etc....)

Note:Minumum 5 from combinational logic(B) and 5 from Sequential logic(C) is compulsory.Basic Logic Gates(A) also a compulsory

TOOLS: XILINX / ALTERA / MODELSIM

References Text Book:-

1. VHDL Primer Third edition by J.Bhaskar, PHI

ELECTIVE PAPERS

MES 4EA*: ADVANCED COMMUNICATION AND RECENT TECHNOLOGIES

MES 4EA1 NANOTECHNOLOGY

Aim – 72 hrs

Total credit - 4

Objective

This paper is designed to provide thestudents with an overview of nanotechnology and its applications, various methods adopted for the synthesis of nanomaterials and modern instrumental techniques suited for the characterization of nanostructured materials.

Module 1 : Introduction to nanotechnology 18 hr

Foundations in nanosciences- introduction- scientific revolutions-basic science behind nanotechnology-nanometre: how big or small-nanotechnology-materials at nanoscale-quantum confinement in nanomaterials-rationale behind the downsizing of the materials-prime materials in nanotechnology-nanomaterials:natural and man made-semiconductor nanomaterials-polymers and composites-metal nanoparticles-biomaterials-unique properties of nanomaterials-microstructure and defects in nanocrystalline materials-effect of nano dimensions on material behaviour(magnetic,electrical,optical and thermal properties).

Module 2 :Nano fabrication 18 hr

Introduction-synthesis of nanopowders using top down and bottom up methods-top down fabrication methods-arc discharge method-laser ablation method –ball miling-inert gas condensation-bottom up fabrication methods- homogenous nucleation-CVD-MBE-sol gel method-hydro thermal synthesis-microwave method-challenges in fabrication.

Module 3 :Nanoscale characterization 18 hr

Introduction-XRD(principle and theory)–SEM(principle,construction and working, advantages and disadvantages) -TEM (principle,construction and working,advantages and disadvantages)-AFM (principle,construction and working,advantages and disadvantages)-STM (principle,construction and working,advantages and disadvantages)- Raman spectroscopy (principle,construction and working)-Nanoindentation.

Module 4 : Application of nanomaterial 18 hr

Nano electronics and electronics applications-MEMS/NEMS-nanosensors-nanocatalysts and nanochemistry-nanophotonics–nanocomputers-nanobiotechnology-nanomedical applicatio ns-food and agriculture industry-cosmetics and consumer goods-structureand engineering-automotive industry-water treatment and the environment-texties-paints-energy-defence and space applications- structural applications.

Nanostructured materials with high application potential-quantum wells-quantum dots-carbon nanotubes-GaNnano wires-multilayered films.

Text books:

1. Nanotechnology : The Science Of Small-M.A Shah & K.A Shah ,Wiley Publication -First Edition 2013 (Module 1,2,3)
2. Textbook Of Nanoscience And Nanotechnology -B S Murty,P Shankar, Baldev Raj, B BRath And James Murday- Universities Press,First Edition 2012.(Module 1,2,3,4)
3. Introduction To Nanotechnology-Charles P .Poole, Jr., Frank J. Owens- Wiley India Edition 2012 .(module 4)

Reference text books:

1. Introduction To Nanoscience And Nanotechnology- K.K. Chattopadhyay,A.N. Banerjee-Phi Publication ,Fourth Printing 2012.(module 2,3,4)
2. Nano : The Essentials- T.Pradeep- Mcgraw Hill Education, Seventh Reprint 2012. (module 1,3,4)
3. Nanotechnology: Basic Science And Emerging Technologies-Mick Wilson, KamaliKannangara,GeoffSmith,michelleSimmons,BurkhardRaguse-Overseas Press 2005.(Module 1,2,3,4)

MES 4EA2 SECURE COMMUNICATION

Time: 72 hrs Total Credit:4

Objective: To provide a practical survey of the principles and practice of cryptography and network security.

Module 1 **12 hrs**

Introduction- Security Trends, OSI Security Architecture. Security attacks-Passive attacks, Active attacks. Security Services-Authentication, Access Control, Data Confidentiality, Data Integrity, Nonrepudiation, Availability Service, Security Mechanisms-Model for Network Security

Module 2 **16 hrs**

Classical Encryption Techniques -Symmetric Cipher model-Cryptography, Cryptanalysis. Substitution Technique -Caeser Cipher, Monoalphabetic Cipher, Playfair Cipher, Hill Cipher, Polyalphabetic Cipher, One time Pad, Transposition Techniques, Rotor Machines, Steganography

Module 3 **16 hrs**

Block Cipher Principles, Data Encryption Standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles. Finite Fields-Groups, Rings and Fields, Modular Arithmetic, The Euclidian Algorithm, Finite fields of the form GF(p),Polynomial arithmetic, Finite fields of the form $GF(2^n)$

Module 4 **18 hrs**

Advanced Encryption Standard. Confidentiality Using Symmetric Encryption -Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random Number Generation

Module 5 **10 hrs**

Firewall Design Principles -Firewall Characteristics, Types of Firewalls, Firewall Configurations. Trusted systems -Data Access Control, The Concept of Trusted Systems, Trojan Horse Defense. Common Criteria for Information Technology Security Evaluation

Text Books:

1."Cryptography and Network Security", William Stallings,4th Edition, Pearson Education Inc.

2."Cryptography Theory and Practice", Douglas A Stinson,2nd Edition, Chapman & Hall, CRC press Company, Washington

3. "Security in Computing" Charles P. Pfleeger, Shari Lawrence Pfleeger, 4th Edition, Prentice Hall.

4."Computer Security Basics" Debby Russell, G.T. Gangemi ,1st Edition O'Reilly Media

MES 4EA3 ADVANCED DIGITAL COMMUNICATION

Unit 1: Information Theory **15 hrs**

Introduction to Information Theory, Measure of Information, Information Sources, Information Content of a Discrete MemorylessSource, Average Information or Entropy, Information Rate,Discrete Memoryless Channels, Channel Representation and Channel Matrix, Special Channels, Mutual Information, Conditional and Joint Entropies, Additive White Gaussian Noise Channel, Shannon's Theorem, Channel Capacity, Capacity of a Guassian Channel, Bandwidth S/N Trade–off, Source Coding, Code Length, Entropy Coding, Shannon- Fano Coding, Huffman Encoding, Examples.

Text Book 1: Chapter 13, Text Book 2

Unit II: Pulse Code Modulation and Delta Modulation **14hrs**

The Sampling Theorem: Low Pass Signals and Band Pass Signals, Aliasing Error, Digital Representation of Analog Signal - Quantization of Signals, Quantization Error , Pulse Code Modulation, Electrical Representation of Binary Digits, PCM System, Companding, A-Law and μ- Law Companding,Differential PCM, Delta Modulation,Slope Overload and Granular Noise, Adaptive DM, PCM Transmission, Calculation of Quantization Noise, Output Signal Power, Output Signal to Quantization Noise Ratio in PCM and DM, Comparison of PCM and DM.

Text Book 1: Chapters 5 and 12

Unit III: Bandpass Modulationand Demodulation **15hrs**

Digital Modulation Techniques: Phase Shift Keying, Amplitude Shift Keying, Frequency Shift Keying,Coherent Detection of PSK and FSK, Non Coherent Detection of Differential Phase Shift Keying, Binary Differential Phase Shift Keying and FSK, Minimum Shift Keying (MSK), Gaussian Minimum Shift Keying (GMSK), M-ary Signalling, Probability of Error in each Scheme, Comparison of Digital Modulation Techniques.

Text Book 3 : Chapter 4 and Text Book 4 : Chapter 2

Unit IV: Error Control Coding **14hrs**

Overview, Redundancy for Error Correction, Linear Block Codes, Hamming Codes, Cyclic Codes, BCH and Reed Solomon Codes, Burst Error Detecting and Correcting Codes,

Convolutional Codes, Convolutional Encoder, Code Tree, State Transition Diagram Representation, Trellis Diagram, Decoding Convolutional Codes, The Viterbi Algorithm.
Text Book 5: Chapter 14

Unit V: Spread Spectrum Techniques **14hrs**

Overview of Spread Spectrum Techniques, Pseudonoise (PN) Sequences, Properties of PseudonoiseSequences, Theory of Spread Spectrum Modulation, Model of Spread Spectrum Digital Communication System, Direct-Sequence Spread Spectrum (DSSS) Systems: Generation and Detection, Example of Direct Sequencing, Processing Gain and Performance, Frequency Hopping Spread-Spectrum (FHSS) Systems: Example, Robustness, Frequency Hopping with Diversity, Fast Hopping versus Slow Hopping, FFH/MFSK Demodulator, Processing Gain,Synchronization : Acquisition and Tracking.
Text Book 3: Chapter 12

Text Books:

1. Taub's Principles of Communication Systems by H Taub, D L Schilling and G Saha, Third Edition 2008, TMH Education Pvt Ltd, New Delhi.
2. Analog and Digital Communications by Hwei P. Hsu, Schaum'sOutline Series, McGraw Hill Education Pvt. Ltd.
3. Digital Communication Fundamentals and Applications byBernard Sklar and Pabitra Kumar Ray, PearsonEducation, 2006
4. Advanced Electronic Communication Systems by Wayne Thomasi, Sixth Edition, PHI.
5. Modern Digital and Analog Communication Systems by B. P. Lathi, Oxford University Press, Fourth Edition.

Additional Readings:

1.Digital Communication byJohn G. Proakis, McGraw Hill., Fourth Edition.
2.Digital and Analog Communication Systems by K Sam Shanmugam, John Wiley and Sons Pvt. Ltd.
3. Digital Communicationsby SimanHaykin, 4th Edition, John Wiley & Sons, Inc.

MES 4EB*: ADVANCED INSTRUMENTATION AND SYSTEMS

MES 4EB1 BIOMEDICAL ELECTRONICS AND BIOSENSORS

Total Hours: 72 **Total Credits: 4**

OBJECTIVES

- To get a basic understanding of fundamental principles of Biomedical Instrumentation
- To understand different Measurement Techniques
- Should able to know different Biosensors

Module 1. Biomedical Signals & Instrumentation **18 Hrs.**

Physiological Systems of the Body(Cardiovascular ,Respiratory &Nervous Systems)—Source of Biomedical Signals—Basic Medical Instrumentation System—Performance Requirements of Medical Instrumentation System—Intelligent Medical Instrumentation System (Microprocessor,Microcontroller&PC Based Instruments)—General Constraints in Design Medical Instrumentation System—Regulation of Medical Devices—Origin of Bioelectric Signals—Recording Electrodes—Electrodes for ECG,EEG&EMG--Electrical Conductivity of Electrode Jellies and Creams—Microelectrodes

Module 2. Physiological Transducers & Biosensors **18 Hrs.**

Introduction—Classification of Transducers—Performance Characteristics of Transducers—Displacement, Position and Motion Transuders (Potentiometric,Variable Capacitance, Variable Inducta-nce, LVDT,Linear Encoders, Piezo-electric) — Pressure Trans-ducers (LVDT,StrainGauge)—Transducers for Body Temperature Measurement(ThermocouplesElectric Resistance Thermometer)—Thermistors(Radiation Thermometery,Silicon Diode,Chemical Ther-mometery)—Photoelectric Transducers (Photovoltaic, Photo-emissive,Silicon Diode,Dode Arrays)—Optical Fiber Sensors (Advantages&Types)—Biosensors—Smart sensors

Module 3. Biomedical Recording &Measurement Systems **20 Hrs.**

Basic Electronic Recording System—General Considerations for Signal Conditioners—Pre Amplifiers--Electrocardiograph—Vectrocardiograph—Phonocardiograph—Electroencephalograph—Electromyograph—Biofeedback Instrumentation--Measurement of Heart Rate—Measurement of Pulse Rate—Blood Pressure Measurement (Direct&Indirect Methods)—Pulse Oximeter—Basis of Diagnostic Radiology(X-Ray)—Computed Tomography(CT Scanners) ;Basic Principle—Laser Applications in Biomedical Field—Basics of Biotelemetry and Telemedicine

Module 4. Environmental Engineering & Biosensors **16 Hrs.**

What is Environmental Engineering—The Environmental Engineering Process-Modeling—Activities of Environmental Engineering—Environmental Hazards and their Management—Global Hazards—Air Pollutions;Introduction—Water Pollutions and Their Effects; Introduction—Management of Environmental Hazards; Approaches &Assement Criteria—Management of Pollutant Releases

Biosensors for Environmental Applications—Introduction—Environmental Pollution due to Heavy Metals --Examples of Biosensors for Heavy Metal Determination.

Text Books

1.Hand Book of Biomedical Instrumentation—R.S.Khandpur,Second Edition-Mc Graw Hill Education **(Module 1,2&3)**

2.Biomedical Instrumentation and Measurements—Leslie Cromwell,Second Edition—PHI Publication **(Refer forModule 1,2&3)**

3.Fundamentals of Environmental Engineering—Danny D. Reible—Lewis Publishers **(Module 4-First Part)**

4. Environmental Biosensors--Edited by Vernon Somerset--Published by InTech—Open Access—www.intechopen.com **(Module 4-Second Part)**

Reference Text Books

1.Introduction to Biomedical Instrumentation—Mandeep Sing—PHI Publication

2.Medical Instrumentation Application&Design—John G.Webster,Third Edition—Wiley Publication

3.Biosensors and their Applications—Victor c.Yang—Springer International Edition

4.Elements of Environmental Science&Engineering—P.Meenakshi,Second Edition—PHI Publication

MES 4EB2 RF SIGNALS AND APPLICATIONS

Time: 72 hours Total Credit:4

Objective: The main objective is to provide students with a thorough understanding of RF components and to acquaint them with some of the methods used in circuit analysis and application.

MODULE 1 **16 hrs**

Introduction to microwave, Microwave region and band designation, Advantages, Application.Wave guides-TE, TM, TEM mode field patterns, Guide wavelength, Group velocity, Phase velocity. Microwave components-Microwave T-junction- H plane Tee junction, E plane Tee, EH plane Tee, Magic Tee, Scattering parameters (Book 1-Chapter 1 & 5)

MODULE 2 **18 hrs**

Transmission Line Analysis

Importance, Examples of transmission line-Two wire line, Coaxial line. Transmission line parameters, Transmission line equation, Lossless line, Distortionless line, Input impedance, Standing wave ratio, power, Shorted line, Open circuit line, Matched line, Smith chart (Book 2-Chapter 10)

MODULE 3 **14 hrs**

Microwave Measurements

Microwave benches, Frequency measurements, Power measurements, Attenuation measurements, Phase shift measurements, VSWR measurements, Impedance measurements (Book 1-Chapter 6)

MODULE 4 **12 hrs**

Active RF Components

Schottky contact, RF diodes, Schottky diode, PIN diode,Varactor diode, IMPATT diode, Tunnel diode, TRAPATT,BARRITT and Gunn diode, RF transistor (Book 3-Chapter 8)

MODULE 5 **12 hrs**

Antennas

Introduction, Types of antenna-Wire antenna, Aperture antenna, Microstrip, Array, Reflector, Lens antenna. Antenna parameters-Radiation power density, Radiation intensity, Directivity, Radiation pattern, Bandwidth, Gain, Input impedance, Efficiency (Book 4-Chapter 1).

TEXT BOOKS:

1."Microwave and Radar Engineering" M Kulkarni,1st edition, Umesh Publications

2."Principles of Electromagnetics" Matthew N.O Sadiku,4th edition, Oxford University Press

3."Microwave Devices and Circuits" Samuel Y Liao,3rd edition, Prentice-Hall, Inc

4."Antenna Theory Analysis and Design" Constantine A Balanis, 2nd edition, John Wiley and Sons

REFERENCE BOOKS:

1."RF Circuit Design-Theory and Applications" Reinhold Ludwig & Powel Bretchko, 1st edition, Pearson Education Ltd.

2."Microwave Engineering" David M Pozar, 2nd edition, John Wiley and Sons, inc.

MES 4EB3 ARTIFICIAL INTELLIGENCE AND NEURAL NETWORKS

HOURS: 72 **TOTAL CREDITS:4**

MODULE I Fundamentals of Artificial Intelligence

Introduction: AI approach, AI problems, Foundation of AI and history of AI, Intelligent agents: Agents and Environments, structure of agents, concept of rationality, Expert system, Searching: searching for solution-Breadth first search, depth first search. Knowledge representation and reasons logical agents, Knowledge based agents, Wumpus world logic, propositional logic, Resolution, Forward and Backward chaining.

Book 3.

MODULE II Fundamental Concepts of ANN

Introduction of ANN, Concept of ANN and its basic mathematical model, McCulloch-Pitts neuron model, Simple perceptron, Adaline and Madaline, Feed –forward multilayer perceptron, Learning and training the neural network, Leaning Process, Delta learning rules for multi perceptron layer, back propogation algorithm.

Book 1.

MODULE III Feed Forward and Feed Back Neural Network

Feed Forward: Introduction, Analysis of pattern Association Networks, analysis of Pattern classification network, analysis of pattern storage network, Feed Back: Introduction, Analysis of linear auto associative FF network.

Book.2

MODULE IV Competitive Learning and Pattern Recognition

Introduction, Analysis of Pattern Clustering Networks, Analysis of feature mapping network, Associative memory, Application of ANN.

Book.2

Text books:

1. Introduction to Artificial Neural Systems: J.M. Zurada, Jaico Publishing House, New Delhi
2. Artificial Neural Network : B.Yagna Narayana, PHI
3. Artificial Intelligence- A Modern Approach. Second Edition, Stuart Russel, Peter Norvig, PHI/Pearson Education.

References:

1. Artificial Intelligence, 2nd Edition , E.Rich and K.Knight(TMH)
2. KOSKO, B. " Neural Networks and Fuzzy Systems" , Prentice-Hall of India Pvt.Ltd.
3. Artificial Neural Networks: K.Mehrotra, C>K Mohan and Sanjay Ranka, Penram International Publications, New Delhi.

EB IX EBV

MAHATMA GANDHI UNIVERSITY
(Abstract)

PG Programme under CSS 2011- Model Question Paper of M Sc Electronics (IV Semester) - Approved - Orders issued.

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ACADEMIC A IX SECTION

U.O.No.1027/Ac.AIX/2/MSc Electronics/2014 Dated, P.D. Hills, 24/02/2014

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ORDER

The Convenor, Expert Committee in Electronics(PG) has submitted the Model Question Paper of M Sc Electronics (IV Semester) under Credit Semester System 2011.

Sanction has been accorded by the Pro – Vice Chancellor for the approval of Model Question Paper of M Sc Electronics (IV Semester) under Credit Semester System with effect from 2012 admission onwards.

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SECTION OFFICER

CURRICULUM DESIGN ABSTRACT

Semester IV

MES 4C1-ADVANCED EMBEDDED SYSTEMS

MES 4P2-VHDL PROGRAMMING LAB

MES 4EA*

MES 4EB*

PROJECT

VIVA-VOCE

MES 4P2 VHDL PROGRAMMING LAB

A. Implementation of Basic Logic Gates

B. Design and simulation of Combinational Logic Circuit using VHDL

1. Adder(Half adder,full adder)
2. 4 bit parallel adder
3. Multiplier
4. Multiplexer and Demultiplexer
5. Encoder and Decoder
6. ALU
7. code converters(gray to binary ,binary to gray)

C. Design and simulation of Sequential logic circuit using VHDL

1. Flip Flop (SR, D, JK, T)
2. Synchronous counters
3. Asynchronous counters
4. Barrel shifter (4*4)
5. Shiftregisters (SISO,SIPO,PISO,PIPO)
6. Modeling of Moore FSM AND mealy FSM
7. Design various counters (decade, mode-12 etc....)

Note:Minumum 5 from combinational logic(B) and 5 from Sequential logic(C) is compulsory.Basic Logic Gates(A) also a compulsory

TOOLS: XILINX / ALTERA / MODELSIM

References Text Book:-

1. VHDL Primer Third edition by J.Bhaskar, PHI

MES 3P5 C++ PROGRAMMING LAB

PART I

1. Programs based on class, objects and manipulation of objects using member functions.
2. Programs based on constructors (copy constructor, default constructor).
3. Programs based on friend function, passing objects as arguments to function.
4. Programs based on array of objects.
5. Programs based on function overloading.
6. Programs based on operator overloading (binary & unary).
7. Programs based on inheritance.
8. Programs based on virtual functions.
9. Programs based on manipulators or ios format functions.
10. Programs based on file handling (create a file and display the contents).

[Any eight programs]

PART II - Programs using the functions in <graphics.h> file.

1. Program to draw lines using line() and linerel().
2. Program to draw a circle using circle().
3. Program to draw an ellipse using ellipse().
4. Program to draw a rectangle using the rectangle().

Use the following functions to modify the above programs:
setcolor(), setbkcolor(), fillellipse(), setfillstyle(), floodfill(), settextstyle() etc.

[Any three programs]

PART III - Programs for PC interfacing

1. Wave form generation using PC.
2. GPIB interfacing with PC.
3. Interfacing ADC with PC.
4. Interfacing DAC with PC.
5. Interfacing Opto couplers with PC.
6. Control of a motor using PC.
7. Temperature monitoring using PC.

[Any four programs]