FACULTY OF ENGINEERING

B.E. 4/4 (ECE) I – Semester (Main & Backlog) Examination, December 2017

Subject: Microwave Engineering

Time: 3 Hours

Max. Marks: 75

Note: Answer all questions from Part A and any five questions from Part B.

PART – A (25 Marks)

1. Define “Dominant mode”. Which is the dominant mode in rectangular waveguide? 2
2. Define group velocity and phase velocity in a waveguide. 3
3. Explain the concept of velocity modulation of electrons in a two cavity Klystron. 2
4. The dominant mode of a wave propagating in rectangular waveguide 2.2 cm x 1 cm and the frequency of operation is 9.4 GHz. Find the guide wavelength. 3
5. State the characteristic features of IMPATT diode. 2
6. What do you understand by electronic tuning of Reflex Klystron? 2
7. Why helix is used as a slow wave structure in TWT? 2
8. What is the dominant mode in circular waveguide? 2
9. List the properties of S matrix. 4
10. List the applications of Magic Tee. 3

PART – B (5x10 = 50 Marks)

11. Derive the field expressions for $TM_{mn}$ modes in a parallel plate waveguide. What happens when m=0? 10

12. a) Find the resonant frequency of cavity resonator of principle mode with dimensions a=2 cm, b=1 cm, c=2 cm length. 5
b) Why TEM mode cannot propagate in rectangular waveguide? 5

13. a) Derive the S matrix of Magic Tee. 6
b) Differentiate between reciprocal and non-reciprocal device. 4

14. Describe the interaction in Multi Cavity Magnetron. What is $\pi$ mode? What are the methods of separation of $\pi$ mode from other modes? Sketch the characteristics of Magnetron. 10

15. Explain the working of PIN diode and its application in microwave test bench. Write short notes on Varactor diode. 10

16. A two cavity Klystron operates at 3.0 GHz. With a DC beam voltage of 900 Volts and the cavity gap spacing of 2.0 mm. If the amplitude of the RF voltage is 20 V, calculate the beam coupling coefficient. What is frequency pulling and frequency pushing? How can it be avoided? 10

17. Discuss the merits and demerits of micro-strip lines and slot lines. Explain the working of a 4 port circulator with neat diagrams. 10
FACULTY OF ENGINEERING
B.E. 4/4 (ECE) I - Semester (New) (Main) Examination, December 2017
Subject: Digital Image Processing (Elective-I)

Time: 3 Hours
Max. Marks: 75

Note: Answer all questions from Part - A and any five questions from Part - B.

PART-A (20 Marks)

1. Define weber ratio. (3)
2. Write the expression to find the number of bits to store a digital image. (2)
3. Obtain Hadamard transform matrix for N=4. (3)
4. Write about KL transform. (2)
5. Draw the model of image degradation process. (2)
6. Differentiate spatial and frequency domain filtering. (3)
7. What is the need for compression? (3)
8. Define compression ratio. (2)
9. What is chain code? (2)
10. What is thresholding? (3)

PART-B (50 Marks)

11. (a) With neat diagrams explain the elements of visual perception. (6)
    (b) Explain the basic relationships between pixels. (4)
12. (a) Obtain the DCT matrix for N=4. (6)
    (b) State and prove any two properties of 2D fourier transform. (4)
13. (a) Explain spatial filtering in image enhancement. (6)
    (b) Discuss high boost filtering. (4)
14. (a) Explain about error free compression. (6)
    (b) Write about transform based compression. (4)
15. (a) Explain point, line and edge detection. (6)
    (b) Write about water shed algorithm. (4)
16. (a) What are the applications of digital image processing? Explain how a digital image is formed. (6)
    (b) Write about elements of digital image processing system. (4)
17. (a) Write about histogram processing. (6)
    (b) Explain bit plane slicing. (4)

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B.E. 4/4 (ECE) I - Semester (New) (Main) Examination, December 2017
Subject: Embedded Systems (Elective – II)

Time: 3 Hours  Max. Marks: 75
Note: Answer all questions from Part A and any five questions from Part B.

PART-A (25 Marks)

1. Differentiate between Embedded System and General purpose computing system? 3M
2. List the applications of Embedded Systems 2M
3. Explain any three data processing instruction of ARM processor 3M
4. Draw and explain the configuration of CPSR register 2M
5. Discuss about PCI/PCI-X Buses 3M
6. Distinguish between Synchronous, Iso-synchronous and Asynchronous communication 2M
7. What is a locator? 2M
8. Differentiate between cross compiler and cross assembler 3M
9. Why is host system used for most stages of development, test and simulation 2M
10. What is a logic analyzer? What is the use of logic analyzer during the development phase? 3M

PART - B (50 Marks)

11. a) Describe various hardware components of embedded system 6M
    b) Discuss about the challenges in embedded systems 4M
12. a) With the help of a neat diagram, explain the architecture of ARM core 7M
    b) Differentiate between RISC and CISC processors 3M

13. a) Discuss in detail about USB Bus 6M
    b) Describe TCP/IP protocol 4M

14. a) Explain in detail about the development process of an embedded system with the help of a design cycle? 6M
    b) Discuss about ROM Emulator 4M

15. a) Describe a case study of Automatic vending machine 8M
    b) How is the final system different from a target system 2M

16. a) Explain about the design process in Embedded System 6M
    b) Explain the 5-stage pipeline of ARM9 processor 4M

17. a) Describe I2C protocol 5M
    b) Explain about In-circuit emulator 5M

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B.E. 4/4 (ECE) I – Semester (New) (Main) Examination, December 2017

Subject: VLSI Design

Time: 3 Hours

Max. Marks: 75

Note: Answer all questions from Part A and any five questions from Part B.

PART – A (25 Marks)

1. Draw the $I_d$ Versus $V_{ds}$ curves for an N-channel Enhancement Mode MOSFET. (2)
2. Give the expression for channel length Modulation. (2)
3. Distinguish between SRAM and SRAM. (2)
4. Realize 2:1 Multiplexer using transmission gates. (3)
5. Draw the schematic diagram of BiCMOS inverter. (3)
6. What is crosstalk? How to avoid it? (3)
7. Draw the schematic diagram of 1 Transistor DRAM cell. (2)
8. Define sheet resistance.? (2)
9. Draw the circuit D-FlipFlop using Transmission Gate?. (2)
10. Calculate the ON Resistance from Vdd to Gnd for the given inverter circuit show in figure. If N-channel sheet resistance is $R_{sp} = 2.5 \times 10^4 \, \Omega$ per square? $R_{sn} = 10^4 \, \Omega$ per square. (3)

\[ \text{PART – B (50 Marks)} \]

11. a) Derive the drain current expression for n channel enhancement MOSFET operating in Non-Saturation and Saturation Region? (5)
   b) Define the term threshold voltage of MOSFET and explain its significance. (5)

12. (a) Draw the stick diagram for the given function $f = (A + B) \overline{C}$ (5)
   (b) Determine pull-up to pull-down ratio of an NMOS inverter driven by another NMOS inverter? (5)

13. a) Calculate the gate capacitance value of 5 μm technology with relative in minimum sized transistor with gate to channel capacitance value of $4 \times 10^{-4}$ pF/μm² (3)
b) Calculate the Total Capacitance for given layout? 5 μm technology Calculate the total area of capacitance CT for multilayer is shown in figure. Find the CP, Cm, Cg? Given data capacitance across Metal1 to substrate 0.075 pF x 10-4/μm2, Polysilicon to substrate 0.1 pF x 10-4/μm2, Gate capacitance Value 1 Cg

14 (a) Explain & Draw the schematic diagram of 6T SRAM cell? Explain its Read and write operation? (5)

(b) Draw and explain the structure of a Carry select adder. (5)

15. (a) Explain the Interconnect RC delay? Give the Elmore delay calculation? (5)
(b) Explain the Interconnect RC delay? What is propagation delay as calculated by

16 (a) Draw the small signal model for Common Source Amplifier with current mirror and Explain with its characteristics? (5)

b) Draw and Explain the Source degeneration and Wilson Current Mirror? (5)

17. Write short notes on the following
   a) Explain the operation of NAND based ROM design? (3)
   b) Draw 3T DRAM Cell and explain the write and Read operation? (3)
   c) Draw the Layout of NOR Gate? (4)
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B.E. 4/4 (ECE) I-Semester (Main & Backlog) Examination, December 2017
Subject: Industrial Administration and Financial Management

Time: 3 Hours
Max. Marks: 75

Note: Answer All Questions From Part–A. Answer any FIVE Questions From Part-B
Answer to the questions of Part – A must be at one place and in the same order as they occur in the question paper. Missing data if any may suitable be assumed.

PART-A (10 x 2.5 = 25 Marks)

1. List the function of management.
2. State the advantages of line organization structure
3. Define the term work study
4. Enumerate the various symbols used in method study.
5. State the objectives of inspection
6. What are the Principles of statistical quality control?
7. Who are materials classified?
8. What are the duties of purchase manager?
9. State the assumptions in break even analysis
10. What are the techniques of capital budgeting?

PART-B (5 x 10 = 50 Marks)

11. a) Draw line and staff organization structure, explain its function, state merits demerit and applications
   b) Differentiate between product layout and process layout
12. a) Explain the principle of motion economy related to human body and work place layout
   b) Explain any three job evaluation methods.
13. a) Explain how quality circles helps to improve the productivity
   b) Plot the necessary control chart using the following data with a sample size of five items. Find out whether the process in under control or not. (standard data : d₂ = 2.326, A₂ = 0.58, D₃ =0, D₄=2.11)

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14. a) Derive an expression for simple EOQ and state their assumptions.
   b) A small engineering project consists of nine activities. Draw the network. Calculate EST and LST of each activity. Calculate total slack for each activity
15. a) How breakeven analysis is useful for business organization
   b) Estimate selling price per unit of electronic component. Following information is for 300 items: Direct material cost is Rs. 1,50,000 Direct labor cost is Rs 85,000 direct expense are Rs. 3,25,000 factory on cost is 15% selling distribution expense are 10% assume profit is 17%

16. a) Explain method study Procedure
   b) Differentiate between Private Ltd and Public Ltd Company.

17. Write short notes on following
   a) Cost of capital
   b) Materials planning
   c) Quality circles

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B.E. 4/4 (ECE) I - Semester (New) Examination, December 2017
Subject: Electronic Instrumentation

Max. Marks: 75
Note: Answer All Questions from Part-A & Answer Any five Questions from Part-B.

Part – A (25 Marks)

1) Define accuracy and Precision of a measurement. (3)
2) Explain the difference between IEEE standards and Measurement standards. (2)
3) What is Radioactivity and which Instrument is used to measure radioactivity? (2)
4) How are Photo emissive and Photo voltaic transducers differ? Give one example of each transducer. (3)
5) What is Dew point? Define Relative humidity. (2)
6) What is Phon? How it is related to SPL. (2)
7) What are the advantages of Digital Voltmeter over Analog Volt Meter? (2)
8) Explain the Virtual Instrumentation concept with examples. (3)
9) Using Action potential diagram of a cell, explain Na-K pump. (3)
10) Compare Ultrasonic and Magnetic resonance Imaging. (3)

Part – B (50 Marks)

11a) Explain type of errors that occur in measurement. What are the methods used to eliminate or estimate the errors? (5)
    b) A 500 volt DC voltmeter has an accuracy of 2% of full range. Calculate the limiting error when the instrument is to read 125 V DC. (5)

12a) What is the principle of Inductive transducer. Explain the functioning of LVDT with a transfer function characteristic. (6)
    b) Compare the three Photo conductive transducers with examples. (4)

13a) Why sound is measured in dB. Write short notes on the types of microphones with diagram. (4)
    b) Define and explain the thermodynamic laws. How is thermocouple used for measurement of temperature? (6)

14a) With a neat block diagram, explain the principle and functioning of a Dual slope digital voltmeter. (5)
    b) What is the use of Delayed Time base Oscilloscope in measurements? Explain using waveforms, the operation of a Delayed time base Oscilloscope. (5)
15) a) Write on Bio-potential electrodes and their specific application. Compare X ray and CT scan imaging techniques.

   b) What is EMG, explain 10-20 electrode configuration of EEG and the signals that are recorded with amplitude and frequency.

16) a) What is the principle of Hotwire anemometer fluid velocity measurement? Explain the constant current and constant voltage type of anemometers.

   b) Explain the block diagram of a Digital storage oscilloscope. What is the advantage of it over Analog storage oscilloscope?

17) Write short notes on two of the following
    a) IEEE Standards
    b) Principle of Wheatstone bridge for strain measurement
    c) Brief on ECG