FACULTY OF ENGINEERING

B.E. 4/4 (ECE) II-Semester (Main) Examination, April / May 2013

Subject : Advanced Topics in Microwave Engineering
(Elective-III)

Time : 3 Hours   **Max. Marks: 75**

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

PART – A (25 Marks)

1. A quarter wave section is used to match a 100 ohm resistive load to a 50 ohm line at a given frequency. Calculate the characteristic impedance of the matching section and VSWR on the main line with matching transformer when the frequency is increased by 20%. (4)
2. Sketch E & H field configuration in the cross section of strip line. (2)
3. What are the advantages and disadvantages of planar transmission lines? (3)
4. What are the requirements of conductor materials used for fabrication of MICs? (2)
5. Find the planar resistance for the following dimensions resistive film length, width and thickness of 10mm, 5mm, 0.1 μm respectively. The sheet resistively of the film is 2.4 x 10^{-8} mho-m. (2)
6. An IMPATT diode has the following parameters : carrier drift velocity = 10^5 m/s. Length of the drift space = 5 μm. Calculate the frequency of oscillation produced. (2)
7. What are the applications of parametric amplifiers? (2)
8. A slotted line is used to measured the frequency and it was found that the distance between null is 1.85 cm. Given the guide dimensions as 3 x 1.5cm, calculate the value of the frequency. (3)
9. What are the various precautions to be taken in microwave measurements? (3)
10. What is the importance of a vector network analyzer? List some important parameter that can be measured using it? (2)

PART – B (50 Marks)

11. A 75 ohm air-filled coaxial line is terminated with complex load of 109.5-j 120 ohms. Design a double stub matching system using short circuited coaxial lines of characteristics impedance 75 ohms. (10)

12. A micro strip line is composed of zero thickness copper conductors on a substrate having εr = 8.4, tanδ =0.0005 and thickness 2.4mm. If the line width is 1mm, and operated at 10GHZ, calculate (a) The characteristic impedance (b) The attenuation due to conductor loss and dielectric loss. (10)

13. With the help of block schematic explain the process of fabrication of thick film MICs. What are the merits and demerits of thick film Technology? (10)

14. Show by necessary derivation that the TRAPATT must have punch through structure for oscillation to occur for TRAPATT mode. (10)

15. Describe how can the power of a microwave generator be measured using (a)Bolometer (b) Calorimeter Techniques. (10)

16. Design a two-section chebyshev quarter wave impedance transformer to match a line with characteristic impedance of 100 ohms to a 200 ohm line. The maximum tolerable reflection coefficient is 0.05. (10)

17. Write short notes on any two of the following: (10)
    (a) Branch line coupler
    (b) Design considerations for Fabrication of lumped inductor in MIC
    (c) Small signal microwave profiles of a BARITT Diode

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FACULTY OF ENGINEERING

B.E. 4/4 (ECE) II-Semester (Main) Examination, April / May 2013

Subject : Television Engineering
(Elective-III)

Time : 3 Hours   **Max. Marks: 75**

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

PART – A (25 Marks)

1. List out the various elements of T.V. system.   (3)
2. What do you understand by the term blanking?   (2)
3. Explain about vertical blanking time.   (3)
4. What is the need of composite video signal?   (2)
5. What are the various components of CRT present in TV?   (2)
6. Explain briefly about Negative picture transmission.   (3)
7. What are the salient features of TV receiver?   (2)
8. Explain about picture tube circuits.   (3)
9. Compare NTSC and PAL.   (3)
10. What do you understand by the standard VHS recording?   (2)

PART – B (50 Marks)

11. Discuss in detail about the TV channel standard of transmission.   (10)

12.(a) List out the steps involved in the construction of composite video signal.   (4)
    (b) Discuss in detail about Linear scanning standard scanning pattern.   (6)

13.(a) What are the characteristics of camera tubes?   (4)
    (b) Explain in detail about arrangements at TV studios.   (6)

14. With a neat block diagram, explain the operation of TV receiver.   (10)

15. Discuss in detail about the Audio / Video signal recording principles of VCR and VCP with neat block diagrams.   (10)

16. Explain in detail about the fundamental concepts of 3 colour systems.   (10)

17. Write short notes on the following: (5+5)
    (a) CATV
    (b) TV Frame and field frequencies

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### B.E. 4/4 (ECE) II-Semester (Main) Examination, April / May 2013

Subject : System Automation and Control
(Elective-III)

Time : 3 Hours **Max. Marks: 75**

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

PART – A (25 Marks)

1. What are the factors that need for a selection of a sensor? (3)
2. Define calibration. (2)
3. The damping ratio and natural frequency of a second order system is 0.2 and 8 rad/sec. respectively calculate the resonant peak and resonant frequency. (3)
4. Write the program instruction for the program given below. (3)
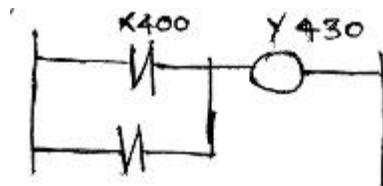
5. Distinguish between transducer and sensor. (2)
6. Define ladder in PLC. (2)
7. What are the limitations of two-step (on-off) control? And in what situation is such a control system commonly used? (3)
8. What are the basic building blocks for thermal system and write down the equations for the same. (2)
9. An OP-AMP is open loop gain of 10^5 and open-loop upper cut off frequency of 10Hz. If the OP-AMP is connected as an amplifier with a closed loop gain at 100, what will be the new upper frequency. (2)
10. Define the term accuracy. (3)

PART – B (50 Marks)

11. In detail explain liquid level and liquid flow sensors. (10)

12.(a) List the criteria to choose suitable data acquisition equipment. (4)
   (b) Explain various signal conditioning modules. (6)

13. With the help of building blocks explain fluid system. (10)

14. Explain about data handling in PLC in detail. (10)

15. Explain electronic proportional derivative controller with necessary circuit diagram. (10)

16. Write about the components of motion control system. (10)

17. Write short notes on the following: (10)
    (a) Role of ADC in data acquisition
    (b) Importance of mathematical model

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B.E. 4/4 (ECE) II-Semester (Main) Examination, April / May 2013

Subject : Speech Processing
(Elective-III)

Time : 3 Hours   Max. Marks: 75

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

PART – A (25 Marks)

1. List the drawbacks of Linear predictive analysis.   (3)

2. What is the importance of using short time magnitude function in speech processing?   (2)

3. What is homomorphic speech processing?   (3)

4. Compare serial and parallel formant synthesizers.   (3)

5. Draw the block diagram of typical text-to-speech system.   (3)

6. What is a vowel triangle?   (2)

7. What are parametric coders and explain the principle behind it?   (2)

8. What are the advantages of vector quantizer coders?   (2)

9. Compare HMM and DTW systems.   (3)

10. Why non-linear quantization, is preferred for speech signals?   (2)

PART – B (50 Marks)

11.(a) Compare differential PCM and ADM.   (6)
   (b) What are the advantages and disadvantages of pitch synchronous analysis?   (4)

12.(a) Explain SIFT algorithm for pitch extraction.   (6)
   (b) Explain how a codebook is formed in vector quantization.   (4)

13.(a) Explain articulatory speech synthesis.   (3)
   (b) Explain Mermelstein's model for speech synthesis.   (7)

14.(a) Explain transform coding in detail.   (7)
   (b) What are channel vocoders?   (3)

15.(a) What are the problems associated with ASR?   (5)
   (b) Explain Dynamic Time warping in detail.   (5)

16.(a) What are formats and how can it be used for feature extraction?   (5)
   (b) Explain various methods used for differentiating the voiced speech from unvoiced speech in a give frame of speech.   (5)

17. Write short notes on the following: (5+5)
   (a) Mechanism of speech production
   (b) Speaker Identification / verification

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FACULTY OF ENGINEERING
B.E. 4/4 (ECE./M/P/Inst) II-Semester (Main) Examination, April / May 2013

Subject : Robotics
(Elective-III)

**Time : 3 Hours**   **Max. Marks: 75**

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

PART – A (25 Marks)

1. Classify Robots based on the following: (3)
   (a) Power source   (b) Method of control   (c) Kinematics
2. Differentiate between 'Revolute Joint' and 'Spherical Joint' with a neat sketch.   (2)
3. Mention any two differences between an Integral controller and a differential controller.   (2)
4. Define the terms 'Proximity' and 'Range' related to Robotics.   (2)
5. Mention how serial manipulators one different from parallel manipulators.   (3)
6. What are the various constraints to be taken into consideration during trajectory planning?   (3)
7. What is the need of programming a Robot? Write a brief note about the programming language 'AML'.   (3)
8. Write a short note on hydraulic drive used in Robots.   (2)
9. Enumerate any two differences between Direct and Inverse kinematics.   (2)
10. What is the significance of redundant depress of freedom is Robot manipulators?   (2)

PART – B (50 Marks)

11. Two points (a_{uvw}, b_{uvw}) given by, a_{uvw} = (4, 3, 2) and b_{uvw} = (6, 2, 4)^T with respect to 'OUVW' coordinate system. Determine the corresponding a_{xyz}, b_{xyz} with respect to the reference coordinate system, if it has been rotated 60° about OZ axis.   (10)

12. Discuss the different steps involved in the link coordinate system (DH coordinates) assignment algorithm.   (10)

13. A two degree of freedom manipulator is shown in figure below. If the length of each link is 1m, establish its link coordinates frames and find O_{A1} and 1_{A2}. Find the inverse kinematic solution for the manipulator.   (10)
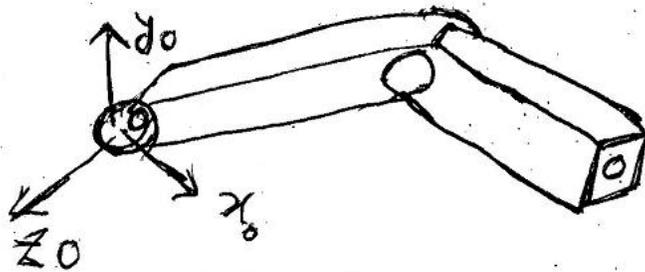
14. A serial manipulator with two links ($\ell_1 = \ell_2 = 4m$) is used to draw a sketch on a plane wall. The current position of the pencil fixed to the end effector is at the point P(3, 5). Find out the Joint parameters forth current position of the manipulator.   (10)

15. (a) Define the term Jacobian of a Robot manipulator.   (3)
    (b) A certain two link manipulator has the following Jacobian

$$O_{J(\theta)} = \begin{bmatrix} (-J_1S_1 - J_2S_{12}) & (-\ell_2S_{12}) \\ (\ell_1C_1 + \ell_2C_{12}) & (\ell_2C_{12}) \end{bmatrix}$$

   Ignoring gravity, determining the joint torques, required so that the manipulator apply a static face vector $(O_F = 10\hat{X}_0)$.   (7)

16. (a) Mention any four Robot driving technologies along with their applications.   (4)
    (b) Describe the strategies used to control Robots. Explain computed torque Technique in detail.   (6)

17. (a) Explain in detail the working principle of an ultrasonic proximity sensor.   (5)
    (b) What is meant by machine vision? Why do we used machine vision methods in Robotics?   (5)

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FACULTY OF ENGINEERING
B.E. 4/4 (Civil/ECE) II-Semester (Main) Examination, April / May 2013

Subject : Intellectual Property Rights
(Elective-III)

Time : 3 Hours   Max. Marks: 75

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

PART – A (25 Marks)

I. Multiple choice :   (3x1=3)

1. The first International Convention on Protection of Intellectual Property Rights. Was
   (a) Berne convention (b) Paris convention (c) Madrid convention (d) TRIPS
2. An invention relating to a product or process can be protected by
   (a) Trade mark   (b) Copyright   (c) Patent   (d) Geographical Indication
3. Broadcast Reproduction Right is related to
   (a) Patents   (b) Copyright   (c) Trade mark   (d) Industrial Designs

II. Fill in the Blanks: (3x1=3)

1. The TRIPS Agreement came into force in the year _____.
2. Generally, passing off is a phenomenon related to _____.
3. The term of protection of a registered design is _____ years.

III. True or False :   (3x1=3)

1. Copyright in India is protected for a period of Lifetime of the author and seventy years thereafter.   (T/F)
2. Product Patent for a pharmaceutical invention cannot be granted in India.   (T/F)
3. Trade secrets are not protected in India under any IPR law.   (T/F)

IV. Match the following: (3x1=3)
1. Berne convention   (a) 1883
2. Paris convention   (b) 1886
3. TRIPS Agreement's enforcement in India   (c) 1995
                                                 (d) 2000
                                                 (e) 2005

V. Problem based questions :   (3x1=3)
1. Is it possible to restrict the assignment of copyright in a literary or musical work by its author during his life time?
2. A well-known company intends to sell its brand for a considerable amount to another company, while continuing to trade in the same business. Is it valid?
3. An Indian company proposes to use a trade mark of a foreign company which never traded in India, without its permission. Will it be valid?

VI. Short notes: (5x2=10)
1. Process Patent
2. Compulsory Licence
3. Geographical Indications of Goods
4. Well-known Trademark
5. Database Rights

PART – B (5x10=50 Marks)

11. Explain the nature and classification of Intellectual Property Rights.
12. Analyse the salient features of the TRIPS agreement.
13. Explain the patentable subject matter in India.
14. Describe the rights and obligations of the Patentees.
15. Define an Industrial design. What are the rights given to the proprietor of a design?
16. Explain the meaning, functions and classification of trade mark.
17. Distinguish Infringement of trademarks from passing-off.

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