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B.E. (E & TC)
ELECTRONIC MEASUREMENT SYSTEMS
(404222) (2003 Course)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:-

1) *Answer three questions from Section - I & three questions from Section - II.*

2) *Answers to the two sections should be written in separate answer books.*

3) *Neat diagrams must be drawn wherever necessary.*

4) *Figures to the right indicate full marks.*

5) *Use of logarithmic table, slide rule, electronic non programmable pocket calculator is allowed.*

6) *Assume suitable data, if necessary.*

SECTION - I

Q1) a)   Explain following term w.r.t. digital multimeter: **[8]**

      i) $3\dfrac{1}{2}$ digit

      ii)   Auto ranging

      iii) True RMS

      iv) Auto zero.

    b)   Draw block diagram of digital LCRQ meter & explain its operation. **[8]**

OR

Q2) a)   Write significance of following w.r.t. any measuring instrument: **[8]**

      i)   Accuracy

      ii)   Resolution

      iii) Precision

      iv) Linearity.

    b)   Draw and explain block diagram of voltage impedance meter.   **[8]**

Q3) a)   For any measurements explain following: **[8]**

      i)   Mean

      ii)   Deviation

      iii) Variance

      iv) Probability for error finding.

    b)   What do you mean by regression analysis? Write its various methods & their advantages.   **[8]**

Q4) a) Explain with suitable diagram how to carry high frequency measurements by using frequency counter technique. **[8]**

b) Explain period & multiple period averaging using digital universal frequency counter. **[8]**

Q5) a) Write technical specifications of : **[8]**
   i) Dual CRO.
   ii) DSO.

b) Classify CRO probes, explain them in brief along with their utility. **[10]**

OR

Q6) a) Compare Analog CRO with DSO. **[5]**
   b) Draw only block diagram of DSO. **[5]**
   c) W.r.t. DSO explain following: **[8]**
      i) Sampling period
      ii) Memory depth
      iii) FFT
      iv) Hanning window.

SECTION - II

Q7) a) Draw & explain block diagram of FFT analyzer. **[8]**
   b) Explain protocol analyzer with suitable block diagram. **[8]**

OR

Q8) Write short note on: **[16]**
   a) Harmonic analyzer.
   b) Spectrum analyzer.
   c) Logic analyzer.

Q9) W.r.t. communication explain how to carry following measurements: **[18]**
   a) Sensitivity
   b) Selectivity
   c) Phase jitter
   d) S/N ratio
   e) Co-channel interference.

*Q10)*a)   Draw & explain block diagram of network analyzer.   **[10]**

b)   Compare scalar & vector network analyzer.   **[8]**

*Q11)*a)   Explain roll of lab view in instrumentation.   **[8]**

b)   What do you mean by virtual instrumentation? Explain it with suitable example.   **[8]**

<div align="center">OR</div>

*Q12)*Write short note on: **[16]**

a)   IEEE 488.

b)   PCI/PCI express interface.

c)   Computer controlled test measurements.

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B.E. (E & T/C)
TELECOMM. NETWORK MANAGEMENT
(2003 Syllabus) (404223)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

  1)   *Use two separate answer books for section I and section II.*

  2)   *Read the questions carefully and concentrate on intensions of questions asked.*

  3)   *Answering to the point will be given the weightage.*

  4)   *Whenever necessary, use neat diagrams to express your views.*

  5)   *If necessary, use of logarithmic tables or slide rule or pocket calculator.*

  6)   *Figures on the right side of question indicates marks.*

  7)   *Assume suitable data if necessary.*

SECTION - I

Q1) a)   What are the communication media involved in telecommunication networks? Classify these communication media with the help of classification chart and give the detailed description of each type of communication medium.   **[12]**

   b)   Suppose, a network is to be designed for a city of Pune having 1 million inhabitants and suppose that during busiest hour there are 4 transactions/ hour made by people Suppose that each transaction on an average causes 4 packets of 1000 bits each. What is aggregate average bits per second carried by network? How many 64 kbps lines are required to carry this traffic ? Assume that each packet travels average on 3 links.   **[6]**

OR

Q2) What are the basic design issues involved in design of telecommunication networks. Describe these issues in detail.   **[18]**

Q3) Explain how Analog Modem is different than Digital modem? Explain principles of operation of analog and digital modems, Give one example of each Analog, digital and broad band modems   **[16]**

OR

Q4) a) With the help of neat diagram, explain generic DSL Network. What is DSL modem? Also, using block diagram, explain how DSL modem works? **[12]**

b) Explain how N-ISDN is different than B-ISDN? **[4]**

Q5) Write short notes on:
   a) Worldwide Interoperability for Microwave Access (WiMAX) **[8]**
   b) Multichannel Multipoint Distribution System (MMDS) **[8]**

OR

Q6) Give the basic principles behind centralized and Distributed DSL Architectures? Compare these architectures with the help of neat diagrams. Explain what is tunneling and how it used in DSL networks. **[16]**

SECTION -II

Q7) What is meant by routing within and in between autonomous systems? Explain what is router? How routing is done? **[18]**

OR

Q8) What is importance of addressing in routing? What is meant by classful addressing? Explain various classes of addressing With the help of neat diagrams? **[18]**

Q9) a) What is network protection? What are the basic requirements of protection? What are the protection mechanisms? **[8]**

b) Answer in one sentence only **[8]**
   - What is network protection?
   - What are the basic requirement of protection?
   - What are the protection Mechanisms?
   - What is network survivability?

OR

Q10) a) What is cross talk and jitter? How jitter and cross-talk affects the quality of service in the networks? **[8]**

b) Answer in one sentence only **[8]**
   - What are the approaches for implementation of protection mechanisms?
   - What are the scopes of repair
   - What are the two layers of recovery model
   - What is network survivability?

Q11) What are the four layers of telecommunication management ? All the four layers are represented by common format of functionality? What that format is? Describe each function in common format. **[16]**

OR

Q12) What is SNMP? What is the structure of SNMP managed Network? With the help of neat diagram describe its key components? What is the series of SNMP protocols and how these are protocols modified from version to version? **[16]**

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B.E. (E & TC)

OPTICAL AND MICROWAVE COMMUNICATION

(2003 Course)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

   1)   Attempt Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from section-I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from section-II.

   2)   Answers to the two sections should be written in separate books.

   3)   Neat diagrams must be drawn whenever necessary.

   4)   Figures to the right indicate full marks.

   5)   Assume suitable data, if necessary.

SECTION - I

Q1) a)   What are the advantages of optical fiber cables over co-axial cable. [6]

   b)   With help of neat diagram explain the working of avalanche photo diode. [6]

   c)   A multimode step index fiber has a relative refractive index difference of 1% and a core refractive index of 1.5. The number of modes propagating at a wavelength of 1.3 μm is 1100. Estimate the diameter of the fiber core. [6]

OR

Q2) a)   Explain the structure of p-i-n photodiode. Explain its operation. Plot responsivity curve as a function of wavelength for p-i-n photodiode constructed of silicon. [6]

   b)   Estimate the external power efficiency of GaAs planner LED when the transmission factor of the GaAs-air interface is 0.68 and the internally generated optical power is 30% of the electrical power supplied. The refractive index of GaAS may be taken as 3.6. [6]

   c)   Determine the normalized frequency at 850 nm for a step index fiber has a core radius of 25 μm, core refractive index of 1.48 and cladding refractive index of 1.46. How many modes propagate in this fiber at 1320 nm and 1550 nm? [6]

Q3) a)   Explain the 3 transmission windows along with the attenuation curve for single mode fiber. [8]

b) What is dispersion? Explain inter - modal and intra-modal dispersion? Explain the two main causes of intra-modal dispersion. [8]

OR

Q4) a) What are linear scattering losses in fiber? [8]

b) State and explain the possible misalignment which may occur when joining compatible fibers. Also comment on insertion loss due to these misalignments. [8]

Q5) a) Explain concept of WDM and hence explain key system features of WDM. [8]

b) What are the applications of optical amplifiers and state advantages of each of them. [8]

OR

Q6) a) Explain basic structure of an STS-1 SONET frame. [8]

b) Explain working of OTDR with suitable diagram. What are the important performance parameters of an OTDR. [8]

SECTION - II

Q7) a) Define S parameters and explain E and H plane Tee with S parameters. [8]

b) Explain directional coupler define coupling coefficient directivity and insertion loss. [8]

OR

Q8) a) Differentiate between TM and TE modes in rectangular waveguide. [8]

b) For a waveguide define the following : [8]
   i) Cutoff Frequency.
   ii) Phase Constant.
   iii) Phase velocity.
   iv) Characteristic wave impedance.

Q9) a) A reflex klystron operates at peak mode n = 2 having beam voltage 350 V and beam current 15mA. If signal voltage is 40 volts calculate input power, output power and efficiency. [8]

b) Compare two cavity klystron and reflex klystron with relevant sketches. [8]

OR

*Q10)*a) Explain process of velocity modulation in reflex klystron. [8]

b) A slow wave structure has pitch angle of 4° it is operating at 5 GHz. Calculate phase constant of traveling wave inside the tube. **[8]**

Q11) a) What is Gunn effect? How oscillations are obtained from Gunn diode? **[8]**

b) Explain working of tunnel diode in brief. **[8]**

c) Compare Trapatt diode and Impatt diode. **[2]**

OR

Q12) a) Draw constructional details and equivalent circuit of varactor diode. Explain its operation with any four applications. **[8]**

b) Write a short note on : Microwave Diode Detector. **[8]**

c) How does Gunn Diode differ from other microwave diodes. **[2]**

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B.E. (E & TC)

DIGITAL IMAGE PROCESSING

(2003 Course) (404225)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) *Answers to the two sections should be written in separate books.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Assume suitable data, if necessary.*

SECTION - I

Q1) a) Noisy Image corrupted by Salt & Pepper noise, is filtered by
   i) 3×3 box filter
   ii) Gaussian filter
   iii) Median filter
   Compare the results.   **[6]**

   b) Explain Image filtering in frequency domain.   **[6]**

   c) Explain
   i)   Additive Noise
   ii) Multiplicative Noise
   iii) Gaussian Noise   **[6]**

OR

Q2) a) What is Image histogram? What information we get from histogram?**[6]**

   b) Explain spatial resolution & gray level (amplitude) resolution in case of digital image.   **[6]**

   c) In a colour image three R-G-B components have intensity profile as shown in figure 2-c. If R-G-B values are converted to HSI component sketch profile of corresponding 'I' component.   **[6]**
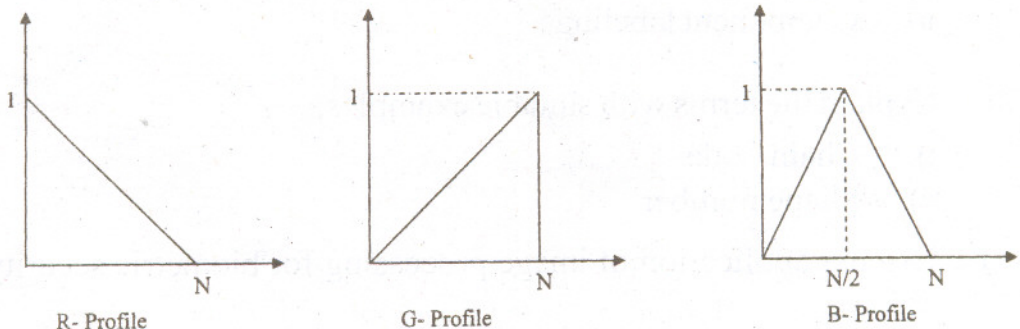

R- Profile   G- Profile   B- Profile

Figure 2-c

Q3) a) What is Pseudocoloring? Give its applications. [8]

b) Explain Homomorphic filtering. [8]

OR

Q4) a) What is Mach-band effect? Explain. [8]

b) Explain image sharpening filter. [8]

Q5) a) Discuss properties of two dimensional Discrete Cosine Transform (DCT). Comment on its computational complexity. [8]

b) Find FDCT

$$\begin{bmatrix} 4 & 2 \\ 4 & 2 \end{bmatrix}$$

[8]

OR

Q6) a) What is KL transform. Discuss its properties & applications. [8]

b) Find one level Haar decomposition.

$$\begin{bmatrix} 4 & 2 \\ 4 & 2 \end{bmatrix}$$

[8]

SECTION - II

Q7) a) Discuss problems in edge detection in case of [8]
   i)   Blurred image
   ii) Noisy image

b) Using polar representation explain concept of Hough transform for line detection. [10]

OR

Q8) a) Explain Laplacian edge detector. Compare it with sobel operator. [8]

b) Explain following segmentation algorithm.
   i)   Region growing
   ii) Component labeling [10]

Q9) a) Explain the terms with suitable examples.
   i)   Chain code
   ii) Shape number [8]

b) Discuss application of image processing for biometric security system. [8]

OR

*Q10)*a) Explain image restoration using Wiener Filtering. [8]

b) Explain how B-spline curves can be used for boundary representation. [8]

*Q11)*a) With suitable examples explain applications of Morphological opening & closing. [8]

b) Explain in brief lossless predictive coding with the help of encoder & decoder. [8]

OR

*Q12)*a) Explain Huffman coding with suitable example. [8]

b) Assume a gray level image represented using 2 bits/pixel.
The probabilities of the four gray levels {0, 1, 2, 3} are as follows.
P (0) = 0.1   P (1) = 0.3
P (2) = 0.5   P (3) = 0.1

i) Determine image entropy.
ii) Determine information redundancy.
iii) Determine achievable lossless compression ratio
iv) Size of 128 × 128 image after lossless compression. [8]

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