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17EC71

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Microwaves and Antennas

Time: 3 hrs.

Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. With neat diagrams, explain the concept of reflex system. (10 Marks)
  b. Calculate the transet time at the cavity gap, transit angle and velocity of electron leaving the gap for 2- cavity klystron that operates at 4GHz with a DC beam voltage of 5kV and 2mm cavity gap. (06 Marks)
  c. Define VSWR. (04 Marks)

OR

2 a. Obtain the transmission line equations from fundamentals. (10 Marks)
  b. A transmission line has a resistance of $2\Omega/m$ with an inductance value of 8n H/m. The conductance of the line is 0.5m mho/m and capacitance is 0.23p.F. f = 1GHz. Find the characteristics impendence of the line and the propagation constant. (04 Marks)
  c. What is a Smith chart? Explain the different measurement that can be determined using a smith chart? (06 Marks)

Module-2

3 a. Explain the properties of S parameters as applicable to a microwave network. (10 Marks)
  b. Write short notes on :
    i) Coaxial connectors and adapters
    ii) Attenuators. (10 Marks)

OR

4 a. What is a Magic Tee? Explain its properties. Also determine its S-matrix. (10 Marks)
  b. Explain a directional coupler and write its S-matrix. (10 Marks)

Module-3

5 a. A certain microstripline has the following parameters.
    $\varepsilon_r = 5.23$ h = 7 mils   t = 2.8 mils   w = 10mils [Note : 1mil = 0.0254mm]. Calculate the characteristic impedance of line (Z_0). (04 Marks)
  b. Explain a parallel strip line, with neat diagram and relevant equations. (06 Marks)
  c. Define the following :
    i) Radiation Intensity
    ii) Aperture of Antenna
    iii) Beam area
    iv) Directivity
    v) Reduction pattern. (10 Marks)

OR

6 a. Derive Friis transmission formula. (08 Marks)
  b. Compute the power received by an antenna in case of transmission over a distance of 150km at 500MHz. When gain G of antennas used are both 25dB. ($P_T = 200W$). (06 Marks)
  c. Obtain a relationship between directivity and effective aperture. (06 Marks)

Module-4

7 a. Plot the field pattern for an array of 2 isotropic sources with equal amplitude and same phase. Take $d = \lambda/2$. (07 Marks)

b. Find Directivity of a source with a sine squared pattern (doughnut) (power pattern). (07 Marks)

c. State and explain power theorem. (06 Marks)

OR

8 a. Obtain the field pattern for a linear uniform array of isotropic antennas for $n = 6$, $d = \dfrac{\lambda}{2}$, $\partial = -d_r$ (08 Marks)

b. Obtain an expression for radiation resistance of a short dielectric dipole. (06 Marks)

c. Define and explain the principle of pattern multiplication. (06 Marks)

Module-5

9 a. From fundamentals obtain the radiation resistance of a small loop antenna. (08 Marks)

b. For a horn antenna, explain the horn antenna optimum dimensions. Explain with an example. (06 Marks)

c. Explain the principle of working of a parabolic Reflector antenna. (06 Marks)

OR

10 a. Define helix geometry. Explain the practical design considerations for the monoflex axial mode helical antenna. (06 Marks)

b. Explain the principle of a Yagi Uda Array Antenna. (08 Marks)

c. Calculate the directivity of a horn antenna with $a_e\lambda = 10\lambda$ $a_H = 9\lambda$ (06 Marks)

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Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Digital Image Processing

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain seven important applications of Digital Image Processing based on the EM energy or frequency range used. **(07 Marks)**
  b. Describe the fundamental steps in digital image processing with a block diagram. **(07 Marks)**
  c. Define D_e, D_4 and D_8 distance between the pixels. Let $V = \{0, 1\}$. Compute D_e, D_4 and D_8 between the pixels p and q for the image segment, Fig.Q1(c). Row and column number starts from (0, 0).

$$\begin{array}{cccc} 3 & 1 & 2 & 1\,(q) \\ 2 & 2 & 0 & 2 \\ 1 & 2 & 1 & 1 \\ (p)\,1 & 0 & 1 & 2 \end{array}$$

Fig.Q1(c) **(06 Marks)**

OR

2 a. Describe the various components of a general purpose image processing system with a block diagram. **(07 Marks)**
  b. Explain the three methods of image acquisition using sensors. **(07 Marks)**
  c. Determine the memory capacity required for storing a 1024 × 1024 monochrome image with 256 intensity levels. If each byte is transmitted with a start bit and a stop bit using a 56 K baud modem then how many minutes are required for transmitting this 1024 × 1024 size image? What is the time required for 3000 K baud DSL without a start and stop bit? **(06 Marks)**

Module-2

3 a. Describe six basic intensity transformation functions with equations, examples and graphs, including piecewise linear transformation functions. **(12 Marks)**
  b. Write the original histogram, transformation function and equalized histogram for the 3 bit, 64 × 64 size image whose information is given in below table.

r_K	$r_0 = 0$	$r_1 = 1$	$r_2 = 2$	$r_3 = 3$	$r_4 = 4$	$r_5 = 5$	$r_6 = 6$	$r_7 = 7$
n_K	790	1023	850	656	329	245	122	81

(08 Marks)

OR

4 a. Describe 2-D impulse, sifting property, 2-D continuous Fourier transform, 2-D sampling theorem and 2-D DFT with equations and examples with respect to digital image processing. **(12 Marks)**
  b. Explain periodicity and symmetric properties of 2D – DFT with equations, diagrams and examples. **(08 Marks)**

Module-3

5 a. Given a = 2 and b = 4, find the mean and variance for uniform noise and exponential noise models along with their PDFs, showing the maximum value. **(06 Marks)**

   b. Explain four types of mean filters. **(08 Marks)**

   c. Describe the three methods of estimation of degradation functions with equations and examples. **(06 Marks)**

OR

6 a. Given a = 2 and b = 4, find the mean and variance for Rayleigh and Gamma noise models along with their PDFs, showing the peak values. **(06 Marks)**

   b. Explain four types of order statistics filters. **(08 Marks)**

   c. Describe adaptive median filter with equations and examples. **(06 Marks)**

Module-4

7 a. Explain RGB color model with diagrams and color equivalent values in binary/HEX. How it can be converted to CMY and HSI models using suitable equations? **(12 Marks)**

   b. Describe the two approaches for pseudo color image processing. **(08 Marks)**

OR

8 a. Explain any six basic morphological algorithms with equations and an example for each. **(12 Marks)**

   b. Describe Erosion, Dilation, Opening and Closing operations with equations and an example for each. **(08 Marks)**

Module-5

9 a. Describe the Laplacian usage for the detection of isolated points with equations and an example. **(08 Marks)**

   b. Explain edge detection principle using the image gradient and different types of masks or operators. **(08 Marks)**

   c. Describe edge linking using local processing technique with an example. **(04 Marks)**

OR

10 a. Describe border following and chain code methods for boundary representation, with examples. **(08 Marks)**

   b. Explain shape numbers and Fourier description used in image shape and boundary representation/description, with examples. **(08 Marks)**

   c. Describe statistical moments used for the representation of boundary segments. **(04 Marks)**

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17EC73

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Power Electronics

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. List out any five applications of power electronics. (05 Marks)
   b. Give symbol and characteristics features of the following devices:
      i) SCR   ii) TRAIC   iii) IGBT   iv) GTO   v) LASCR. (10 Marks)
   c. Explain the peripheral effects of power electronics. (05 Marks)

OR

2 a. Explain the steady state V-I characteristics of IGBT and switching characteristics of MOSFET. (10 Marks)
   b. List out the merits of MOSFETs. (05 Marks)
   c. Explain how transistors are protected against high di/dt. (05 Marks)

Module-2

3 a. With a neat sketch, describe the two transistor model of a thyristor and obtain the expression for anode current. (10 Marks)
   b. Explain, thyristor characteristics and modes of operations. (10 Marks)

OR

4 a. Bring out the differences between natural and forced commutations. (04 Marks)
   b. Explain the operation of a full wave RC firing circuit with waveforms. (08 Marks)
   c. A UJT is connected across a 20V DC supply the valley and peak point voltages are 1 volt and 15V. The period of UJT relaxation oscillator is 20ms. Find the value of charging capacitor, if a charging resistor of 100KΩ is used. (08 Marks)

Module-3

5 a. Explain the working of single phase dual converter. How if operates in four quadrants? (10 Marks)
   b. Derive an expression for average value of output voltage for 1φ full wave controlled rectifier with RL load. (10 Marks)

OR

6 a. With a neat diagram and relevant waveforms explain 1φ full wave controller for ON-OFF control. Derive an expression for rms value of load voltage in on-off AC voltage controller. (10 Marks)
   b. Explain 1φ Bidirectional AC voltage controllers with inductive loads. (06 Marks)
   c. In an ON-OFF control circuit using 1φ, 230V, 50hz supply the ON time is 10 cycles and OFF time is 4 cycles. Calculate the RMS value of the output voltage. (04 Marks)

Module-4

7 a. Explain the principle of operation of step down chopper with R load. **(08 Marks)**

   b. A DC chopper has a resistive load of 30Ω and input voltage V_S = 220V. When the chopper is ON, the voltage drop is 1.5V and chopping frequency is 20kHz. If duty cycle is 60%, determine the average output voltage, rms output voltage and chopper on time. **(08 Marks)**

   c. With relevant graphs, explain how choppers are classified. **(04 Marks)**

OR

8 a. With neat figure, explain buck regulator. **(10 Marks)**

   b. With the help of circuit diagram and relevant waveforms, explain the working of a Buck-Boost regulator. **(10 Marks)**

Module-5

9 a. Explain the operation of single phase half bridge inverter with inductive load, derive the expression for rms output voltage if the input is square wave with peak output voltage is V/2. **(10 Marks)**

   b. Explain the performance parameters of inverters. **(10 Marks)**

OR

10 a. Explain the operation of thyristorized current source inverter. What are its advantages? **(10 Marks)**

    b. Write short note on:
        i) DC-link inverter   ii) Sinusoidal PWM. **(10 Marks)**

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17EC741

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Multimedia Communication

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1   a.   List the five basic types of communication network that are used to provide multimedia services. Explain with a neat diagram:
(i)   Data Networks
(ii) Integrated Services Digital Network   (10 Marks)
    b.   Explain the principle of operation of packet switched network with neat diagrams. (07 Marks)
    c.   Derive the maximum block size that should be used over a channel which has BER probability of 10^{-4} if the probability of a block containing an error and hence being discarded is to be 10^{-1}.   (03 Marks)

OR

2   a.   Explain with neat diagrams, Movie on Demand and Near Movie on Demand (MOD/N-MOD) application.   (08 Marks)
    b.   Explain the operational modes of multipoint conferencing with neat diagrams.   (06 Marks)
    c.   Determine the propagation delay associated with the following communication channels:
(i)   A connection through a private telephone network of 1 km
(ii)   A connection through a PSTN of 200 km
(iii)   A connection over a satellite channel of 50,000 km
Assume velocity of propagation of a signal in the case of (i) and (ii) is 2×10^8 m/sec and in the case of (iii) is 3×10^8 m/sec.   (06 Marks)

Module-2

3   a.   Explain the principle of operation of PCM speech CODEC with a block diagram. Also explain compressor and expander.   (08 Marks)
    b.   Explain Interlaced Scanning principle with a diagram.   (06 Marks)
    c.   Derive the bit rate and the memory requirements to store each frame that result from the digitization of a 525 line system assuming a 4:2:2 format. Also find the total memory required to store a 1.5 hour movie/video.   (06 Marks)

OR

4   a.   With the aid of diagram, explain the following:
(i)   Aspect ratio of display screen
(ii)   Raster scan
(iii)   4:2:2   (08 Marks)
    b.   Explain different types of text in detail.   (06 Marks)
    c.   Assuming the bandwidth of a speech signal is from 50 Hz through to 10 kHz and that of a music signal is from 15 Hz through to 20 kHz. derive the bitrate that is generated by the digitization procedure in each case assuming the Nyquist sampling rate is used with 12 bits per sample for the speech signal and 16 bits per sample for the music signal. Derive the memory required to store a 10 minute passage of stereophonic music.   (06 Marks)

Module-3

5 a. A message comprising of a string of characters with probabilities e = 0.3, n = 0.3, t = 0.2, w = 0.1, . = 0.1 is to be encoded. The message is "went." Compute the arithmetic code word.
(08 Marks)

   b. With the aid of diagrams, explain JPEG encoder. (08 Marks)

   c. Explain CPU management in multimedia operating system. (04 Marks)

OR

6 a. A message and its probability of occurrence of each character is as follows:
A and B = 0.25, C and D = 0.14, E, F, G and H = 0.055.
(i) Use Shannon's formula to derive the minimum average number of bits per character.
(ii) Construct the Huffman code tree and derive a suitable set of code word. (08 Marks)

   b. Explain the principle of LZW compression. (06 Marks)

   c. Explain the main features of distributed multimedia system. (06 Marks)

Module-4

7 a. Explain Linear Predictive coding encoder and decoder with neat schematic. (08 Marks)

   b. A digitized video is to be compressed using the MPEG-1 Standard. Assuming a frame sequence of I BBP BBP BBP BBI... and average compression ratios of 10:1 (I), 20:1 (P) and 50:1 (B), derive the average bit rate that is generated by the encoder for both NJSC and PAL formats. (08 Marks)

   c. Explain different frame types. (04 Marks)

OR

8 a. Explain DPCM encoder and decoder with a neat diagram. (10 Marks)

   b. What do you understand by the terms:
(i) Group of pictures   (ii) Prediction span   (iii) Motion compensation
(iv) Motion estimation   (v) Temporal masking (10 Marks)

Module-5

9 a. Explain scalable rate control with a neat block diagram. (10 Marks)

   b. Explain video streaming architecture with a neat diagram. (10 Marks)

OR

10 a. Discuss briefly about Integrated Packet Networks. (10 Marks)

    b. Explain briefly about errors and losses in ATM. (10 Marks)

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Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Cryptography

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Prove that [(a mod n) + (b mod n)]mod n = (a + b) mod n.   **(07 Marks)**
   b. Consider $f(x) = x^3 + x^2 + 2$ and $g(x) = x^2 - x + 1$.

      Find : i) $f(x) + g(x)$ ii) $f(x) * g(x)$ iii) $\dfrac{f(x)}{g(x)}$.   **(07 Marks)**

   c. State the axioms of groups and rings.   **(06 Marks)**

OR

2 a. List and explain the properties of modular arithmetic.   **(07 Marks)**
   b. Define the term divisibility. State the properties of divisibility for integers.   **(07 Marks)**
   c. Find $\gcd[a(x_2), b(x_1)]$ for $a(x) = x^6 + x^5 + x^4 + x^3 + x^2 x + 1$ and $b(x) = x^4 + x^2 + x + 1$.

                                                                               (06 Marks)

Module-2

3 a. With an example, explain playfair cipher.   **(10 Marks)**
   b. With a block diagram, explain Fiestal encryption and decryption.   **(10 Marks)**

OR

4 a. With an example, explain how transposition technique when applied on the plaintext.

                                                                               (10 Marks)
   b. With a neat diagram, explain DES encryption and decryption and key generation. **(10 Marks)**

Module-3

5 a. Explain how to design and analyze, stream cipher with respect to linear complexity and correlation immunity.   **(10 Marks)**
   b. With schematic of AES structure, explain the operation of AES.   **(10 Marks)**

OR

6 a. Design and explain the stream cipher using the following LF – SR.
      i) Geffe generators
      ii) Bilateral Stop and Go-generator.   **(10 Marks)**
   b. With neat diagram, explain the AES key expansion.   **(10 Marks)**

Module-4

7 a. State Fermat's theorem. Prove that $a^{p-1} \equiv 1(\bmod p)$. **(07 Marks)**
   b. Write an elaborate note on Man-in-the-Middle attack. **(07 Marks)**
   c. Define what is an Abelian Group. **(06 Marks)**

OR

8 a. State and prove Euler's theorem. **(06 Marks)**
   b. Explain Diffie – Hellman key exchange. **(07 Marks)**
   c. Write a note on elliptic curve over real numbers. **(07 Marks)**

Module-5

9 a. Explain digital signature algorithm. **(10 Marks)**
   b. Explain in detail how N-Hash function is obtained. **(10 Marks)**

OR

10 a. Explain in detail secure Hash algorithm. **(10 Marks)**
    b. Explain in detail MD5 hash function. **(10 Marks)**

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17EC752

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
IOT and Wireless Sensor Networks

Time: 3 hrs.

Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Explain the IBM IOT conceptual Framework. Describing the function of each level. (08 Marks)
   b. What are the major components of IOT system? (08 Marks)
   c. Differential between software and Firmware. (04 Marks)

OR

2 a. What are the functions of gateway at data adaptation layer? (08 Marks)
   b. Explain the various wireless communication technologies. (08 Marks)
   c. State the 3 domains of M2M architecture. (04 Marks)

Module-2

3 a. Explain 6LoWPAN protocols. (08 Marks)
   b. State and explain any 2 application layer protocols. (08 Marks)
   c. Differentiate cloud, grid and web computing. (04 Marks)

OR

4 a. Explain and compare the features of IPV4 and IPV6. (08 Marks)
   b. Explain IOT cloud service using Nimbits (08 Marks)
   c. State the function and DHCP protocol. (04 Marks)

Module-3

5 a. Explain how temperature can be measured using Arduino UNO. (10 Marks)
   b. Explain the security homography and layer attack models. (10 Marks)

OR

6 a. Explain the steps involved in programming MQTT client and Server. (10 Marks)
   b. Explain the following: i) Use Miscues cases   ii) IOT privacy and security. (10 Marks)

Module-4

7 a. Explain about transceivers – structures, tasks and characteristics. (10 Marks)
   b. Explain about energy consumption and requirements of batteries for WSNs. (10 Marks)

OR

8 a. Explain the programming Paradigms and programming models. (10 Marks)
   b. Explain node mobility, sink mobility and event mobility. (10 Marks)

Module-5

9 a. Explain SMACS protocol. Also explain the 4 cases of link setup. (10 Marks)
   b. Explain about multipath unicast routing. (10 Marks)

OR

10 a. Explain about hierarchical network of clustering. (10 Marks)
   b. Explain PAMAS and TRAMA. (10 Marks)

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USN ☐☐☐☐☐☐☐☐☐☐   **17EC755**

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Satellite Communication

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1.   a. With neat sketches, explain injection velocity and its resulting trajectories. **(08 Marks)**
    b. Discuss three empirical expressions that explained planetary motion with neat pictorial representation. **(06 Marks)**
    c. Explain the piece of information required to determine Antenna look angle. A Geostationary satellite is located at 90°W. Calculate the Azimuth angle and elevation angle for an Earth station antenna at latitude 35°W and longitude 100°W, where R = 6371Km, a_{GSO} = 42164Km. **(06 Marks)**

OR

2.   a. With a neat sketch, explain the satellite stabilization techniques and compare them. **(08 Marks)**
    b. What is Antenna look angles? Explain the Geometry involved to determine the look angles for Geostationary orbits. **(06 Marks)**
    c. With neat sketches classify satellite orbits. **(06 Marks)**

Module-2

3.   a. Explain the role and function of power supply in satellite subsystem. **(08 Marks)**
    b. Explain the function of attitude control and TT & C subsystem. **(06 Marks)**
    c. With neat sketch, explain the operation of solar cell. **(06 Marks)**

OR

4.   a. Discuss the major components of an Earth station, Architecture. **(08 Marks)**
    b. With neat sketches, explain the hardware categorized for Earth station. **(06 Marks)**
    c. Discuss the tracking Techniques used in satellite communication. **(06 Marks)**

Module-3

5.   a. Explain the basic concept of TDMA and explain its typical frame structure. **(08 Marks)**
    b. Explain the operation of SDMA is conjunction with other types of Multiple Access Techniques. **(06 Marks)**
    c. Compare FDMA and TDMA techniques. **(06 Marks)**

OR

6.   a. Derive a suitable expression for transmission equation in SATELLITE LINK DESIGN. **(08 Marks)**
    b. Discuss significant bearing propagation considered during SATELLITE LINK DESIGN. **(06 Marks)**
    c. Classify and explain various satellite services offered by satellite communication. **(06 Marks)**

Module-4

7 a. Discuss the advantages and disadvantages of satellite over terrestrial networks. (08 Marks)
   b. With neat sketches broadly classify the communication transponders. (06 Marks)
   c. Explain the typical satellite constellation of IRIDIUM network. (06 Marks)

OR

8 a. With neat sketch, explain VSAT typical networks and its topologies. (08 Marks)
   b. Describe the functional blocks of two types of DTH services. (06 Marks)
   c. Explain basic blocks of satellite telephone networks. (06 Marks)

Module-5

9 a. Compare Ariel and satellite Remote sensing satellite in weather forecasting satellites. (08 Marks)
   b. Classify sensors for remote sensing satellite payload. (06 Marks)
   c. Classify Remote securing satellite system and explain them. (06 Marks)

OR

10 a. Explain the types of Images and its classification for remote sensing satellites. (08 Marks)
   b. Write a note on Images formed by weather forecasting satellites. (06 Marks)
   c. Describe the working principles of GPS. With its neat diagram. (06 Marks)

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Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Cryptography and Network Security

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1   a. Find the GCD (1160718174, 316258250) using Euclidean algorithm.   (05 Marks)
    b. For the group $G = \langle Z_{10}*, X \rangle$
        i)   Find the order of the group
        ii) Find the primitive roots in the group
        iii) Show that the group is cyclic.   (07 Marks)
    c. Explain the types of cryptanalytic attacks on encrypted messages.   (08 Marks)

OR

2   a. Find the multiplicative inverse of 550 in mod 1759.   (05 Marks)
    b. Find $f(x) \times g(x)$ in GF (2^8) with irreducible polynomial $(x^8 + x^4 + x^3 + x + 1)$ if $f(x) = x^6 + x^4 + x^2 + x + 1$ and $g(x) = x^7 + x + 1$.   (07 Marks)
    c. Encrypt using Hill Cipher for the plain text "PAY MORE MONEY" with the KEY

$$\begin{bmatrix} 17 & 17 & 5 \\ 21 & 18 & 21 \\ 2 & 2 & 19 \end{bmatrix}$$

(08 Marks)

Module-2

3   a. Write the difference between stream cipher and block cipher.   (05 Marks)
    b. What are the requirements a public key cryptosystem must full fill to be a secure algorithm?   (05 Marks)
    c. Explain the RSA Algorithm. In RSA system it is given P = 17, q = 31, e = 7, M = 2. Find the cipher text C.   (10 Marks)

OR

4   a. Explain AES key generation algorithm with appropriate block diagram.   (10 Marks)
    b. Explain Man-in-middle attack on Diffie-Hellman algorithm.   (05 Marks)
    c. Consider the elliptic curve defined over E_{23} (1, 1). Let P = (3, 10) and Q = (9, 7). Find P + Q and 2P.   (05 Marks)

Module-3

5   a. Define the hash function, mention the application of one-way hash function and describe the requirements for a hash function.   (10 Marks)
    b. Explain basic steps involved in generation of hash code using MD_5 algorithm with neat diagram.   (10 Marks)

OR

6 a. Write a short note on HMAC. (05 Marks)
   b. What is digital signature? List the requirements of digital signature. (05 Marks)
   c. Describe the digital signature algorithm (DSA) and show signing and verification is done using DSS. (10 Marks)

Module-4

7 a. Explain the various phases of SSL handshake protocol with a neat diagram. (10 Marks)
   b. List and explain all the parameters defined in SSL session and SSL connection states. (10 Marks)

OR

8 a. Explain the steps involved in operation of SSL record protocol with a neat diagram. (10 Marks)
   b. Explain the IEEE 802.11 i phase of operation in detail. (10 Marks)

Module-5

9 a. What are the services provided by the PGP? Draw the appropriate diagram to explain it and mention the types of algorithm used for it. (12 Marks)
   b. List and explain various functionality of S/MIME and also mention the header fields defined in MIME. (08 Marks)

OR

10 a. What is IPsec? Write the applications of IPsec and draw the IPsec scenario diagram. (10 Marks)
    b. Explain the IP security architecture with the relevant diagram. (10 Marks)

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Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Satellite Communication and Remote Sensing

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. With a neat diagram, explain the main components associated with the remote sensing activity. **(08 Marks)**
   b. List the advantages and limitations of satellite remote sensing. **(04 Marks)**
   c. What is outer space treaty? What additional principles does it include? **(08 Marks)**

OR

2 a. Outline the benefits of environmental monitoring from satellite sensors. **(10 Marks)**
   b. Illustrate the milestones in Remote Sensing observation. **(10 Marks)**

Module-2

3 a. Explain about the major spectral bands within Em spectrum that are used in Remote sensing observation with relevant diagram. **(10 Marks)**
   b. Explain the following energy terms with relevant expressions as applied to Remote Sensing applications:
      (i)   Emittance (M)
      (ii) Radiant Irradiance (E)
      (iii) Radiance (L)
      (iv) Reflectance (ρ)
      (v)   Transmittance (τ) **(10 Marks)**

OR

4 a. Explain about major types of surface reflection over a variety of surface roughness conditions. **(10 Marks)**
   b. Illustrate the reflectance properties of a green leaf with relevant spectral signature curve? **(10 Marks)**

Module-3

5 a. Define the resolution of a sensor system? List the types of resolution of EO sensors? Briefly explain about spectral resolution and radiometric resolution of a sensor. **(10 Marks)**
   b. Explain the principle of working of Along track scanner with the help of a neat diagram. Specify any two applications of along track scanner. **(10 Marks)**

OR

6 a. Summarize the range resolution and Azimuth resolution of a Radar system with neat diagram and equation. **(10 Marks)**
   b. Extend the Non imaging application of Radar Altimetry with the aid of a neat diagram and relevant equation. **(10 Marks)**

Module-4

7 a. What are the variables that can be retrieved from R.S imagery? Briefly explain the constraints in using Remote Sensing data? **(10 Marks)**

   b. Explain how you would incorporate Remote Sensing into an earth observation project, with a neat diagram. **(10 Marks)**

OR

8 a. With the help of a neat block diagram, explain the different approaches to image interpretation. **(10 Marks)**

   b. Explain the generalized procedure for the Interpretation of remote sensing imagery with a neat diagram. **(10 Marks)**

Module-5

9 a. With a neat diagram, explain the hierarchical organization of visual interpretation criteria. **(10 Marks)**

   b. Explain how Shadow's help in object recognition with the help of a suitable diagram. **(10 Marks)**

OR

10 a. With the aid of suitable diagram, explain the process in color formation. **(10 Marks)**

    b. List the elements of visual interpretation? Explain the effect of Geometric distortions on image interpretation. **(10 Marks)**

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Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
CMOS VLSI Design

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Write all the masks steps of P-well process and draw the CMOS P-well inverter showing V_{DD} and V_{SS} substrate connections.   (10 Marks)
   b. With neat diagrams and relevant expression, explain the cutoff, linear and saturation regions formation in MOSFET with different values of V_{gs} and V_{ds}.   (10 Marks)

OR

2 a. Write all the mask steps of nMOS process and draw the cross-sectional view of nWell CMOS inverter.   (10 Marks)
   b. Draw the ideal and non-ideal characteristics of MOSFET and bring out the differences between them along with the reasons for those differences.   (10 Marks)

Module-2

3 a. Write the lambda based design rules for layers, wires and transistors.   (10 Marks)
   b. Calculate the capacitance of the structure shown in Fig Q3(b) with the following data.
   Area capacitance value for metal 1 to substrate $= 0.3pF \times 10^{-4}/\mu m^2$ (0.075 relative value)
   Area capacitance value for polysilicon to substrate $= 0.4pF \times 10^{-4}/\mu m^2$ (0.1 relative value).
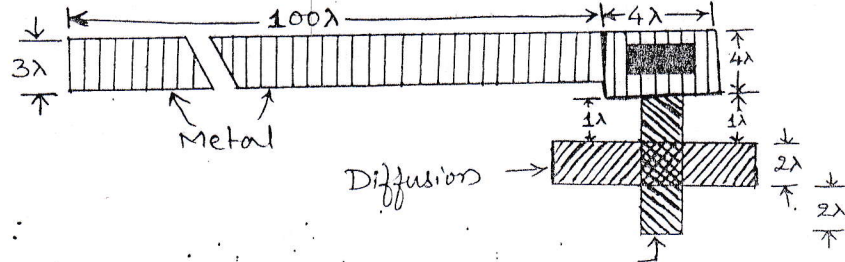

Fig Q3(b)   (10 Marks)

OR

4 a. Draw the nMOS and CMOS stick diagrams for 2 I/P NAND gate and 2 I/P NOR gate.   (10 Marks)
   b. Calculate the area capacitance of the layer in the Fig Q4(b) for the following criteria.
   i)   If the layer is metal 1 and relative capacitance is 0.075 C_g
   ii) If the layer is polysilicon and relative capacitance is 0.1 C_g
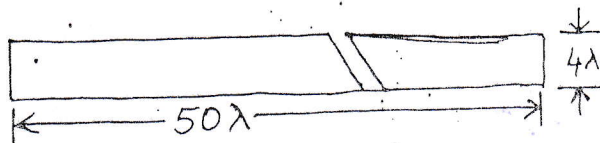   iii) If the layer is n-type diffusion and relative capacitance is 0.25 C_g.

Fig Q4(b)   (10 Marks)

Module-3

5 a. With relevant diagrams, explain the different basis bus architectures. (10 Marks)

   b. With relevant expressions, explain 4-bit carry-look ahead adder. (10 Marks)

OR

6 a. Implement the ALU functions like EX-OR, EX-NOR, AND and OR operations with an adder. Write the block diagram of 2-bit ALU using adder element. (10 Marks)

   b. Obtain the Scaling factors for the following parameters.
      i) Gate Capacitance (C_g)
      ii) Gate Area (A_g)
      iii) Maximum operating frequency (f_o)
      iv) Power dissipation per gate (P_g)
      v) Gate delay (T_d) (10 Marks)

Module-4

7 a. Explain clocked CMOS logic and Pseudo nMOS logic in detail. (10 Marks)

   b. With nMOS stick diagram, explain the structured design approach for the implementation of parity generator. (10 Marks)

OR

8 a. Explain Programmable Logic Array (PLA) in detail. (10 Marks)

   b. Draw the block diagram of Generic structure of FPGA fabric and explain it. (10 Marks)

Module-5

9 a. Write all the system timing considerations. (10 Marks)

   b. Explain three transistor dynamic RAM with neat circuit and stick diagram. (10 Marks)

OR

10 a. With the help of block diagram, explain the process of logic verification. (10 Marks)

   b. Write short notes on :
      i) Built In Self Test (BIST)
      ii) Observability and Controllability. (10 Marks)

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