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15TE71

Seventh Semester B.E. Degree Examination, Dec.2019/Jan.2020 Cryptography and Network Security

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Describe the additive and multiplicative inverse modulo 8 in finite fields of the form $GF(2^n)$. (06 Marks)
b. Explain transposition Ciphers with an example. (04 Marks)
c. Outline the concept of groups, rings and fields. (06 Marks)

OR

- 2 a. Explain the Euclidean algorithm with an example. (05 Marks)
b. Describe one time pad encryption technique with an example and its difficulties. (05 Marks)
c. Briefly explain the Caesar, Playfair and Hill Ciphers, with example. (06 Marks)

Module-2

- 3 a. Illustrate the Feistel Encryption and Decryption process with its structure. (06 Marks)
b. With relevant diagram, explain the process of AES Encryption. (06 Marks)
c. Explain RSA algorithm. (04 Marks)

OR

- 4 a. Illustrate the process of DES encryption with diagram. (06 Marks)
b. Explain Diffie - Hellman key exchange algorithm. (04 Marks)
c. With the help of neat diagram, explain elliptic curve arithmetic and rules. (06 Marks)

Module-3

- 5 a. Explain surface and about its cryptanalysis. (05 Marks)
b. Outline N-Hash algorithm with neat diagram. (06 Marks)
c. Discuss the design goals of MD4 Algorithm. (05 Marks)

OR

- 6 a. Explain MD5 Hash function. (05 Marks)
b. Describe Secure Hash Function with one SHA operation (06 Marks)
c. Explain DSA algorithm. (05 Marks)

Module-4

- 7 a. With the help of block diagram, explain SSH protocol stack. (04 Marks)
b. Draw the neat flow diagram and explain Hand Shake protocol Action in SSL. (06 Marks)
c. Explain IEEE 802.11i phases of operation with flow diagram. (06 Marks)

OR

- 8 a. Explain SSL protocol stack with session state and connection status parameters. (05 Marks)
b. With neat flow diagram, explain SSH transport layer protocol packets exchanger and packet formation. (07 Marks)
c. Explain IEEE 802.11i services and protocols. (04 Marks)

Module-5

- 9 a. Explain PGP cryptographic functions with relevant diagram. (10 Marks)
b. With the help of diagram, explain typical scenario of IP security usage. (06 Marks)

OR

- 10 a. Describe the cryptographic algorithms used in S/MIME. (07 Marks)
b. Identify the fields in top level ESP packet format. (05 Marks)
c. Briefly explain the applications of IP security. (04 Marks)

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15EC72

Seventh Semester B.E. Degree Examination, Dec.2019/Jan.2020 Digital Image Processing

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. With the help of a block diagram, explain the fundamental steps in digital image processing. (10 Marks)
b. Explain the concept of sampling and quantization using a single example. (06 Marks)

OR

- 2 a. Explain the importance of brightness adaption and discrimination in image processing. (06 Marks)
b. Explain 'false contouring' and check board pattern in image processing. (06 Marks)
c. Explain city block distance with an example. (04 Marks)

Module-2

- 3 a. Explain the power law transformation and piece –wise linear contrast stretching with a neat graphical illustration. (10 Marks)
b. Explain with a block diagram, the basic steps for image filtering in frequency domain. (06 Marks)

OR

- 4 a. Perform histogram, equalization of the 5×5 image.

Gray level	0	1	2	3	4	5	6	7
Number of pixels	0	0	0	6	14	5	0	0

Table Q4(a)

whose data is shown in table Q4(a). (08 Marks)

- b. Explain the smoothing of images in frequency domain using : (08 Marks)
i) ideal low pass filter ii) butter worth low pass filter.

Module-3

- 5 a. Explain the basic model of image restoration process. Explain any four important noise probability density functions. (10 Marks)
b. Explain minimum mean square error (Wiener) filtering in image processing. (06 Marks)

OR

- 6 a. Explain adaptive mean filter and list its advantages. (08 Marks)
b. With necessary mathematical equations, explain estimate the degradation function by modeling. (08 Marks)

Module-4

- 7 a. Develop a procedure for converting : (08 Marks)
i) RGB to HSI model
ii) HSI to RGB model. (08 Marks)
b. Obtain the Harr transform matrix for $N = 4$. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 8 a. Write a note on pseudocolor image processing. Explain intensity slicing as applied to pseudo color image processing. (08 Marks)
- b. Explain Erosion and Dilation in image processing. (08 Marks)

Module-5

- 9 a. Explain Marr-Wildreth edge detector in image processing. (08 Marks)
- b. Explain MPP algorithm in image representation (MPP – Minimum Perimeter Polygon). (08 Marks)

OR

- 10 a. Explain basic global thresholding with iterative algorithm. (08 Marks)
- b. Explain simple descriptors and Fourier descriptors. (08 Marks)

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15TE72

Seventh Semester B.E. Degree Examination, Dec.2019/Jan.2020 Satellite Communication and Remote Sensing

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Briefly discuss the historical developments of remote sensing. (08 Marks)
b. Write a note on developments involved in international space law. (08 Marks)

OR

- 2 a. Elaborate the benefits of environmental monitoring from satellite sensors. (08 Marks)
b. Discuss the source of information on remote sensing activity. (08 Marks)

Module-2

- 3 a. With neat diagram explain the spectral bands of electro-magnetic spectrum involved in remote sensing. (06 Marks)
b. With neat graph and equations explain the electromagnetic radiation laws. (06 Marks)
c. Define the following with symbol and unit of measurement.
i) Radiant exitance ii) Spectral radiant irradiance iii) Spectral radiance iv) Albedo. (04 Marks)

OR

- 4 a. With neat graph discuss spectral signature of various covers involved in remote sensing, also given the factors affecting the spectral signatures. (08 Marks)
b. Discuss the characteristics of EM radiation in the microwave region. (08 Marks)

Module-3

- 5 a. Elaborate the working of cross-track scanners with scheme of functioning. (06 Marks)
b. Write a note on SPOT satellite mission. (06 Marks)
c. Discuss microwave radiometers with their operation and applications in remote sensing. (04 Marks)

OR

- 6 a. With neat diagram and equations discuss the range resolution, azimuth resolution and terrain effects on a radar image. (08 Marks)
b. Write a note on geostationary and polar orbiting meteorological satelliter. (08 Marks)

Module-4

- 7 a. Elaborate the steps followed to carry out a remote sensing project. (10 Marks)
b. Explain the constraints in using remote sensing data. (06 Marks)

OR

- 8 a. Discuss the types of interpretation approaches to extract information from remote sensing data. (08 Marks)
b. Given the generalized procedure for the interpretation of remote sensing imagery. (08 Marks)

Module-5

- 9 a. Discuss the effect of geometric characteristics and spectral resolution on visual analysis of remote sensing data. (06 Marks)
b. With the hierarchical organization discuss the criteria for visual interpretation. (06 Marks)
c. With examples, discuss the multi temporal analysis approaches of satellite images. (04 Marks)

OR

- 10 a. Brief out visual interpretation of brightness and color in remote sensing. (08 Marks)
b. Explain the effect of shadow and spatial patterns on visual interpretation of satellite images. (08 Marks)

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15EC73

Seventh Semester B.E. Degree Examination, Dec.2019/Jan.2020 Power Electronics

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. What is a converter? How are power converters classified? Explain briefly. (08 Marks)
b. Give symbol, characteristic features of the following devices:
GTO, TRIAC, MOSFET, UJT (08 Marks)

OR

- 2 a. With necessary waveforms, explain the steady state characteristics of a power transistor. (08 Marks)
b. Draw the switching model of MOSFET and explain its switching characteristics with neat figure. (08 Marks)

Module-2

- 3 a. With a neat figure, explain the dynamic turn-on and turn-off characteristics of a thyristor. (08 Marks)
b. Derive expression for anode current using two-transistor model in case of SCR. (08 Marks)

OR

- 4 a. What is forced commutation? With the help of circuit diagram and waveform, explain the operation of class-A commutation. (08 Marks)
b. With neat circuit diagram and waveforms, explain RC – Half wave firing circuit. (08 Marks)

Module-3

- 5 a. With a circuit diagram and waveform, explain the working of a single-phase full converter with RL load. Derive an expression for the average voltage across the load. (08 Marks)
b. What is a dual converter? Explain its operation with a neat circuit diagram. (08 Marks)

OR

- 6 a. What is an AC voltage controller? With the help of waveform, explain ON-OFF AC voltage controller. (08 Marks)
b. Explain the operation of single phase bi-directional AC voltage controller for inductive load with the help of circuit diagram and waveforms. (08 Marks)

Module-4

- 7 a. Explain the working principle of step-down chopper and derive expression for :
(i) Average output voltage
(ii) Output power
(iii) Effective input resistance in terms of chopper duty cycle. (08 Marks)
b. Explain the operation of a step-up chopper with resistive load. (08 Marks)

OR

- 8 a. With the help of circuit diagram, explain four quadrant type E Chopper. (08 Marks)
b. With the help of circuit diagram and waveforms, explain the working of a Buck regulator. Derive the expression for peak-peak-ripple current of the inductor. (08 Marks)

Module-5

- 9 a. Explain the operation of single-phase half bridge inverter with feedback diodes, derive the expression for r.m.s output voltage. (08 Marks)
b. With the help of circuit diagram and waveform, explain the operation of transistorized current source inverter. What are the advantages and disadvantages of CSI? (08 Marks)

OR

- 10 a. Explain the performance parameters of inverters. (08 Marks)
b. Explain the variable DC link inverter with circuit diagram and waveforms. (04 Marks)
c. Write short note on static switches. (04 Marks)

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15TE73

Seventh Semester B.E. Degree Examination, Dec.2019/Jan.2020 CMOS VLSI Design

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Explain the DC transfer characteristics of complementary CMOS inverter and mark all the regions of operation with necessary expressions for V_{out} in each region. (07 Marks)
- b. Describe with neat diagram, the P-well fabrication process. (06 Marks)
- c. Compare CMOS and Bipolar technology. (03 Marks)

OR

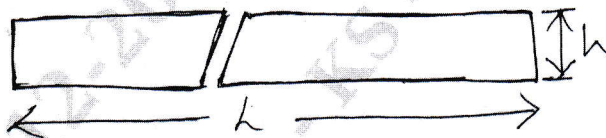
- 2 a. Explain nMOS fabrication process. (07 Marks)
- b. Discuss :
 - i) Channel length modulation (06 Marks)
 - ii) Body effect. (03 Marks)
- c. Demonstrate the operation of tristate inverter with neat diagram. (03 Marks)

Module-2

- 3 a. Explain ' λ ' based design rules for wires (nMOS and CMOS). (08 Marks)
- b. Draw the stick diagram/layout for the nMOS implementation of the Boolean function $\overline{X} = A + BC$. (08 Marks)

OR

- 4 a. Define sheet resistance ' R_s ' and standard unit of capacitance $\square C_g$. Estimate the value of capacitance in $\square C_g$ for the given metal layer shown in Fig.Q4(a), if features size is $2\lambda \times 2\lambda$ and relative value of metal to substrate = 0.075. (04 Marks)



$$L = 2\lambda$$
$$W = 3\lambda$$

Fig.Q4(a)

- b. Estimate rise-time and fall time for CMOS inverter. (06 Marks)
- c. Explain inverting and non-inverting type nMOS super buffer. (06 Marks)

Module-3

- 5 a. Determine the scaling factors for the following :
 - i) Gate capacitance ' C_g '
 - ii) Gate delay ' T_d '
 - iii) Saturation current ' I_{dss} '
 - iv) Current density ' J '. (08 Marks)
- b. Explain the design of 4 bit shifter using 4×4 crossbar switch. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Explain 4 bit data path for processor with neat block diagram. (04 Marks)
b. Explain Manchester carry chain. (04 Marks)
c. Explain Carry LookAhead Adder (CLA) and represent the 4 bit block CLA unit. (08 Marks)

Module-4

- 7 a. Discuss the architectural issues related to sub-system design. (04 Marks)
b. Explain the structured design of a parity generator with necessary blocks and stick diagram. (08 Marks)
c. Explain switch logic of a 4 – way multiplexer for nMOS switches. (04 Marks)

OR

- 8 a. Explain pseudo – nMOS logic for NAND gate and inverter. (04 Marks)
b. Explain in detail the generic structure of an FPGA. (06 Marks)
c. Discuss goals and techniques of FPGA. (06 Marks)

Module-5

- 9 a. What are timing considerations in system design? (04 Marks)
b. Explain the working of 3 transistor dynamic RAM cell. (07 Marks)
c. Explain observability and controllability in testing. (05 Marks)

OR

- 10 a. Explain CMOS pseudo static D-flip-flop circuit. (06 Marks)
b. Discuss the following :
i) Ad-hoc testing
ii) IDDQ testing. (10 Marks)

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15EC741

Seventh Semester B.E. Degree Examination, Dec.2019/Jan.2020 Multimedia Communication

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Discuss the different types of communication network that are used to provide multimedia communication service. (08 Marks)
- b. Explain the communication modes available to transfer the information stream. (08 Marks)

OR

- 2 a. Determine the propagation delay associated with the following communication channels.
 - i) A connection through a private telephone network of 1km
 - ii) A connection through a PSTN of 200km
 - iii) A connection over a satellite channel of 50,000kmassume that the velocity of propagation of a signal in case of i) and ii) is $2 \times 10^8 \text{ms}^{-1}$ and in case iii) $3 \times 10^8 \text{ms}^{-1}$. (06 Marks)
- b. Explain the QoS parameter associated with a packet-switched network. (06 Marks)
- c. Discuss any one entertainment application of multimedia. (04 Marks)

Module-2

- 3 a. Illustrate the different types of text data representation. (06 Marks)
- b. Calculate the time to transmit the following digitized images at both 64kbps and 1.5mbps.
 - i) A $640 \times 480 \times 8$ VGA – compatible image
 - ii) A $1024 \times 768 \times 24$ SVGA – compatible image. (06 Marks)
- c. The band width of speech signal is from 50Hz through to 10KHz and that of a music signal is from 15Hz through to 20KHz. Compute the bit rate that is generated by the digitization procedure by assuming the Nyquist sampling rate of 12 bits per sample for speech signal and 16 bits per sample for the music signal. (04 Marks)

OR

- 4 a. Assuming the CD-DA standard is being used, compute the time to transmit a 30 second portion of the title using a transmission channel of bit rate : i) 64 kbps ii) 1.5 Mbps. (04 Marks)
- b. With the aid of block diagram explain PCM signal encoding and decoding principle. (08 Marks)
- c. Why is the chrominance signal transmitted in the form of two color different signals? Identify the color difference signals associated with the NTSC and PAL systems. (04 Marks)

Module-3

- 5 a. A message and its probability of occurrence of each character is of follows :
A and B = 0.25, C and D = 0.14, E, F, G and H = 0.055.
 - i) Find the minimum average number of bits per character using Shannon's formula.
 - ii) Construct Huffman code tree and derive a code word set. (08 Marks)
- b. Define distributed multimedia system with neat block schematic and also highlight its features. (08 Marks)

OR

- 6 a. Discuss multimedia operating system with respect to CPU management, memory management, I/O management and file system management. (08 Marks)
b. With the aid of neat block diagram explain JPEG encoder. (08 Marks)

Module-4

- 7 a. Discuss the principles of differential pulse code modulation with neat block diagram. (08 Marks)
b. Using block diagram explain h-261 video–encoder principles. (08 Marks)

OR

- 8 a. Explain principle of linear predictive coding with neat block schematic. (08 Marks)
b. A digitized video is to be compressed using the MPEG – 1 standard. Assuming a frame sequence of: IBBPBBPBBPBBI.
And average compression ration of 10 : 1(I), 20 : 1(P) and 50 : 1(B), derive the average bit rate that is generated by the encoder for both NTSC and PAL digitization formats. (08 Marks)

Module-5

- 9 a. Explain video streaming architecture with neat block diagram. (08 Marks)
b. Discuss the protocol stacks for media strumming using block diagram. (08 Marks)

OR

- 10 a. Using neat block diagram how distortion is measured in terms of quantization parameter in R(D) model. (08 Marks)
b. Explain the different instances that may cause the end-to-end delays in ATM network. (08 Marks)

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15EC744

Seventh Semester B.E. Degree Examination, Dec.2019/Jan.2020

Cryptography

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. List the properties of modular Arithmetic in Z_n . (05 Marks)
b. For $f(x) = x^7 + x^5 + x^4 + x^3 + x + 1$ and $g(x) = x^3 + x + 1$, find
i) $f(x) \cdot g(x)$ ii) $f(x) / g(x)$. (05 Marks)
c. State the axioms of groups and rings. (06 Marks)

OR

- 2 a. List the classes of polynomial arithmetic. (04 Marks)
b. Find inverse of $x^8 + x^4 + x^3 + x + 1$ in $x^7 + x + 1$ using extended Euclidean. (06 Marks)
c. Find gcd $[a(x), b(x)]$ 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. Encrypt the plain text "HARD WORK" using Hill Cipher with key
 $\begin{vmatrix} 7 & 8 \\ 19 & 3 \end{vmatrix}$ and decrypt the same. (10 Marks)
b. Explain Caesar cipher with an examples. (06 Marks)

OR

- 4 a. Draw the single round DES algorithm and explain the process in detail. (08 Marks)
b. Encrypt the plain text "ELECTRONICS" using a play fair cipher with a key. "INDIA", also give rules for encryption. (08 Marks)

Module-3

- 5 a. Write a note on Linear Feedback shift registers. (06 Marks)
b. Write a neat diagram of AES encryption and decryption process. (10 Marks)

OR

- 6 a. Briefly describe SubBytes and shift rows in AES algorithm. (10 Marks)
b. Write a note on Linear Congruential generates. (06 Marks)

Module-4

- 7 a. Write RSA algorithm. Perform an encryption and decryption using RSA algorithm for $p = 3$, $q = 11$, $e = 7$ and $m = 5$. Find the cipher text 'c' and decrypt 'c' to get plain text M. (10 Marks)
b. State Fermat's little theorem. Find the result of $3^{90} \text{ mod } 91$. Use Fermat little theorem. (06 Marks)

OR

- 8 a. In Diffie Hellman key exchange $q = 71$, its primitive root $\alpha = 7$. A's private key is 5, B's private key is 12. Find i) A's public key ii) B's public key iii) Shared secret key. (08 Marks)
- b. Write a note on Elliptic curve Arithmetic on the Elliptic curve $E_{23}(1, 1)$, $P = (3, 10)$ and $Q = (9, 7)$. Find i) $P + Q$ ii) $2P$. (08 Marks)

Module-5

- 9 a. What is one way hash function? Explain birthday attack. (08 Marks)
- b. List the design goals of MD4. (04 Marks)
- c. List four criticisms against DSA. (04 Marks)

OR

- 10 a. Explain Digital Signature Algorithm. (10 Marks)
- b. Write a note on Secure Hash Algorithm. (06 Marks)

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15EC752

Seventh Semester B.E. Degree Examination, Dec.2019/Jan.2020 IOT and Wireless Sensor Networks

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Explain any two IOT conceptual frameworks. (06 Marks)
- b. With neat diagram, explain the M2M architecture. (04 Marks)
- c. Describe MQTT protocol for M2M/IOT connectivity. (06 Marks)

OR

- 2 a. Describe the IOT reference model suggested by CISCO that gives a conceptual framework for a general IOT system. (06 Marks)
- b. Explain how data enrichment can be achieved before data dissemination to the network. (04 Marks)
- c. Describe the XMPP protocol. (06 Marks)

Module-2

- 3 a. With neat diagram, show how the four layers generate data stack for the network and physical layers during internet communication. (06 Marks)
- b. Explain the functions of HTTP and HTTPs ports. (04 Marks)
- c. List any six features in Nimbits cloud platforms. (06 Marks)

OR

- 4 a. What are the features of IPv4 and IPv6 protocols? (05 Marks)
- b. With neat diagram, explain 6LoWPAN adaptation layer protocol for IEEE 802.15.4 network device. (06 Marks)
- c. With examples, explain the four cloud service models. (05 Marks)

Module-3

- 5 a. Explain how Arduino platform is programmed using IDE. (08 Marks)
- b. What is an IoT reference architecture with respect to the function group component. Illustrate a threat analysis tool for analysis during a stride. (08 Marks)

OR

- 6 a. Describe how the data is read from the sensors and devices. (08 Marks)
- b. Explain a layered attacker model with possible attacks and suggest the solutions for mitigating the attacks on the layers. (08 Marks)

Module-4

- 7 a. Explain the characteristic requirements for a Wireless Sensor Networks. (06 Marks)
b. With a neat diagram, describe a single node architecture in a wireless sensor networks. (06 Marks)
c. Write a program to wiring components to form a configuration. (04 Marks)

OR

- 8 a. What are the enabling technologies for Wireless Sensor Networks? (06 Marks)
b. Distinguish the four transceiver operational states. (04 Marks)
c. Differentiate event based programming and process based programming. (06 Marks)

Module-5

- 9 a. Explain low duty cycle and wake-up concepts in Wireless Sensor Networks. (06 Marks)
b. With relevant diagram, explain LEACH protocol. (06 Marks)
c. State and explain Right-Hand Rule to Recover Greedy Routing (GPSR). (04 Marks)

OR

- 10 a. With neat schematic diagram, explain CSMA protocol. (06 Marks)
b. Explain the SMAC protocol. (06 Marks)
c. Explain how passive clustering can be achieved in Wireless Sensors Networks. (04 Marks)

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15EC755

Seventh Semester B.E. Degree Examination, Dec.2019/Jan.2020 Satellite Communication

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Explain Kepler's Laws of planetary motion. Also derive expression for orbital period. (08 Marks)
- b. With neat sketches, define :
- Apogee and perigee
 - Prograde and retrograde orbit
 - Inclination
 - Argument of perigee. (08 Marks)
- OR
- 2 a. Explain briefly the following :
- Orbital perturbation (08 Marks)
 - Sun transit outage and Earth eclipse of satellite. (04 Marks)
- b. i) Define Azimuth and Elevation. (04 Marks)
- ii) An Earth station located at 30°W longitude and 60°N latitude. Determine look angle parameters with respect to GEO satellite located at 50°W longitude. The orbital radius is 42164km. (Assume radius of earth to be 6378km). (04 Marks)

Module-2

- 3 a. i) Mention functions carried by different subsystems of a typical satellite. (08 Marks)
- ii) With neat sketches, explain the working of solar cell. (08 Marks)
- b. Explain Telemetry, tracking and command subsystem. (08 Marks)
- OR
- 4 a. Explain Earth station architecture with neat block diagram. (08 Marks)
- b. Explain satellite tracking techniques. (08 Marks)

Module-3

- 5 a. Explain :
- Demand assigned FDMA (08 Marks)
 - Pre-assigned FDMA. (08 Marks)
- b. Explain general TDMA frame structure. (08 Marks)

OR

- 6 a. With usual notation, derive satellite transmission equation. (06 Marks)
b. Discuss the parameters influence the design of satellite communication link. (10 Marks)

Module-4

- 7 a. i) Explain communication related application of satellites. (08 Marks)
ii) List the frequency bands used in satellite communication. (08 Marks)
b. With neat sketches, explain VSAT. (08 Marks)

OR

- 8 a. Define transponder. Explain the types of transponders used in satellite. (08 Marks)
b. Discuss the advantages and disadvantages of satellite over terrestrial network. (08 Marks)

Module-5

- 9 a. With neat sketches, explain the principle of working of :
i) Optical remote sensing (08 Marks)
ii) Thermal infrared remote sensing. (08 Marks)
b. Classify the sensors used in remote sensing satellites. (08 Marks)

OR

- 10 a. i) Discuss the types of images taken by weather forecasting satellites. (08 Marks)
ii) Mention the applications of weather forecasting satellites. (08 Marks)
b. Explain the working principle of GPS. (08 Marks)

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