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18EC71

Seventh Semester B.E. Degree Examination, July/August 2022 Computer Networks

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 five components of data communication. (06 Marks)
- b. Explain the communication between two devices with data flow diagram. (06 Marks)
- c. Explain all the physical topology available in the network. (08 Marks)

OR

- 2 a. Explain circuit switched network and packet switched network with a neat diagram. (06 Marks)
- b. Explain TCP/IP protocol suite. (08 Marks)
- c. With neat diagram, explain the encapsulation and decapsulation in the internet. (06 Marks)

Module-2

- 3 a. With a neat diagram, explain Address Resolution Protocol (ARP) and ARP packet. (10 Marks)
- b. Explain the following : i) Byte stuffing and unstuffing (10 Marks)
ii) Bit stuffing and unstuffing.

OR

- 4 a. With neat diagram, explain stop and wait protocol, its FSM and flow diagram. (10 Marks)
- b. Explain CSMA and show the behavior of the three persistence methods of CSMA. (10 Marks)

Module-3

- 5 a. Explain with neat diagram datagram approach and virtual – circuit approach in packet switching. (14 Marks)
- b. An organization is granted block of addresses with the beginning address 14.24.74.0/24. The organization needs to have 3 subblocks of address to use in its three subnets : One subblock of 10 addresses. One subblock of 60 addresses and one subblock of 120 addresses. Design the subblocks. (06 Marks)

OR

- 6 a. Explain IPv4 datagram with neat figure. (10 Marks)
- b. Explain Link-State-Routing with its Link-State Database. (10 Marks)

Module-4

- 7 a. Explain Go-Back-N protocol with its FSM. (10 Marks)
- b. Explain Selective-Repeat protocol with its FSM. (10 Marks)

OR

- 8 a. Explain UDP services along with neat diagram of Pseudo header for checksum. (10 Marks)
- b. List the TCP features. Explain TCP segment format with diagram. (10 Marks)

Module-5

- 9 a. Explain the following with diagram : i) WWW ii) HTTP iii) FTP. (10 Marks)
- b. With neat architecture diagram explain E-mail. (06 Marks)
- c. Explain POP 3 with diagram. (04 Marks)

OR

- 10 a. Explain Local versus Remote logging in TELNET. (06 Marks)
- b. Explain DNS Name Space, DNS in the internet and resolution. (10 Marks)
- c. Explain the ways, the DNS can be attacked and how the security of DNS provided. (04 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.

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18EC72

Seventh Semester B.E. Degree Examination, July/August 2022 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. Derive the expression for drain current in linear and saturation region for nmos transistor. (10 Marks)
- b. Implement the following circuits using CMOS logic (10 Marks)
- Inverter
 - Pass transistor.

OR

- 2 a. Explain the non ideal IV effect of MOSFET with respect to CMOS Channel length modulation and also explain Noise Margin with diagram and equations. (10 Marks)
- b. Implements the following circuits using CMOS logic (10 Marks)
- 2 input NAND gate
 - Transmission gate.

Module-2

- 3 a. Describe with neat sketches the fabrication of P – well CMOS inverter. (08 Marks)
- b. Explain the process of photolithography with a neat diagram in CMOS technologies. (06 Marks)
- c. Draw the stick diagram for the following CMOS logic (06 Marks)
- $Y = \overline{A + B + C}$
 - 2 input NAND gate.

OR

- 4 a. Explain the layout Design Rules for MOS process with two metal layers. (06 Marks)
- b. Draw the stick diagram for the CMOS logic $Y = \overline{(A + B + C)D}$ and estimate the cell area. (06 Marks)
- c. Define scaling. Explain the constant voltage scaling and the effect of scaling on device characteristics. (08 Marks)

Module-3

- 5 a. Explain with a waveform the propagation Delay, Rise times and Fall Times of a CMOS inverter. (08 Marks)
- b. Derive the equation of propagation Delay using RC Delay Model for a 1st order system. (06 Marks)
- c. Compute the Elmore Delay for V_{out} in the 2nd order RC system. (06 Marks)

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OR

- 6 a. Explain Parasitic Delay of common gates in Linear Delay Model. (08 Marks)
b. Design a circuit to compute $F = AB + CD$ using NAND and NOR by Bubble pushing. (06 Marks)
c. Calculate the minimum delay in C to compute $F = AB + CD$ using the circuits with NAND and NOR gates and with AOI gates. Each input can present a maximum of 20λ of transistor width. The output must drive a load equivalent to 100λ of transistor width. Choose transistor sizes to achieve this delay. (06 Marks)

Module-4

- 7 a. Explain Resettable Latches and FlipFlops using CMOS transmission Gate. (10 Marks)
b. Explain the Multistage pass transistor logic driven by two non overlapping clocks. (10 Marks)

OR

- 8 a. Explain conventional CMOS flipflops with neat diagrams. (10 Marks)
b. Explain Domino CMOS Logic. (10 Marks)

Module-5

- 9 a. Explain the operation of three transistor dynamic RAM cell. (10 Marks)
b. Explain Full CMOS static RAM cell with schematic diagram. (10 Marks)

OR

- 10 a. Write short notes on :
i) Built in Self Test (BIST)
ii) Scan Design Technology (10 Marks)
b. Explain briefly logic verification principle with a block diagram. (10 Marks)

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18EC732

Seventh Semester B.E. Degree Examination, July/August 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. Define the following:
- i) Orbit and trajectory
 - ii) Ascending and descending nodes in an orbit
 - iii) Apogee and Perigee distance
 - iv) Semimajor and Semiminor axis
 - v) Umbra and penumbra region of an eclipse. (10 Marks)
- b. Explain different types of satellite orbits. (10 Marks)

OR

- 2 a. Explain three Keplers law of planetary motion. (10 Marks)
- b. i) A satellite is located at 37° west and another located at 74° East. If both these satellites are in circular equatorial geostationary orbit with an orbital radius of 42164km, determine the inter-satellite distance. (05 Marks)
- ii) Explain satellite spin stabilization technique employed for altitude control of a satellite. (05 Marks)

Module-2

- 3 a. Explain the block schematic arrangement of a basic TT&C subsystem. (10 Marks)
- b. Explain the different subsystems of a satellite. (10 Marks)

OR

- 4 a. With neat sketch, explain different types of Earth station antennas used in satellite communication. (10 Marks)
- b. Mention different satellite tracking techniques classified on the basis of methodology used. Explain monopulse tracking. (10 Marks)

Module-3

- 5 a. With typical block diagram, explain the two common forms of MCPC systems. (10 Marks)
- b. Explain the important parameters that influence the design of a satellite communication link. (10 Marks)

OR

- 6 a. Show how transmission equation relates the received power level, transmitted RF power, operating frequency and transmitter, receiver distance. (10 Marks)
- b. i) Explain how frequency reuse is employed in SDMA. (05 Marks)
- ii) Explain SDMA/FDMA system. (05 Marks)

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Module-4

- 7 a. Mention the different frequency bands employed in satellite communication, explain basic elements of a satellite communication system. (10 Marks)
- b. Explain the advantages and disadvantages of satellite networks over terrestrial networks. (10 Marks)

OR

- 8 a. Mention the types of transponders, explain bent pipe (or) transparent transponder. (10 Marks)
- b. Explain with neat diagram a satellite cable television. (10 Marks)

Module-5

- 9 a. Explain the various sensor systems on board of a remote sensing satellite. (10 Marks)
- b. Write a note on how image of Earth's surface is constructed by the data sent by the satellite sensors. (10 Marks)

OR

- 10 a. Define how remote sensing systems are classified explain active microwave remote sensing. (10 Marks)
- b. Explain the various applications of a remote sensing satellites. (10 Marks)

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18EC741

Seventh Semester B.E. Degree Examination, July/August 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. Define the term IoT. Explain CISCO Seven leveled reference model for IoT. (08 Marks)
b. With neat sketch, explain IETF suggested modified OSI model for IoT/M2M systems. (08 Marks)
c. Explain how data enrichment can be achieved before data dissemination to the network. (04 Marks)

OR

- 2 a. Describe XMPP protocol with necessary diagram. (08 Marks)
b. Define M2M communication. Explain the M2M architecture. (08 Marks)
c. List the functionalities of MQTT brokers. (04 Marks)

Module-2

- 3 a. With neat sketch, explain 6lowPAN protocol and its features. (08 Marks)
b. Explain how packets route over the internet using a set of four routers between source and destination. (06 Marks)
c. Define cloud computing. Explain different services provided by cloud computing. (06 Marks)

OR

- 4 a. Explain IoT cloud-based data collection, storage and computing services using Nimbits. (08 Marks)
b. Explain the features of HTTP protocol. (06 Marks)
c. Explain cloud computing deployment models. (06 Marks)

Module-3

- 5 a. Explain security requirements and threat analysis. (10 Marks)
b. Write and explain traffic light control programming using Arduino UNO. (10 Marks)

OR

- 6 a. What is IoT Security Tomography? Explain in detail the layered attacker model. (10 Marks)
b. Explain five levels for software development for applications and services for IoT or M2M. (10 Marks)

Module-4

- 7 a. Explain the hardware components of a sensor node. (08 Marks)
b. Explain the challenges for wireless sensor networks. (06 Marks)
c. Explain different types of mobility in WSN. (06 Marks)

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OR

- 8 a. Explain optimization goals and figures of merit in sensor network. (08 Marks)
b. Explain Gateway concepts in sensor networks. (08 Marks)
c. List the enabling technologies for WSN. (04 Marks)

Module-5

- 9 a. Explain LEACH protocol in sensor network. (10 Marks)
b. With neat diagram, explain CSMA protocol. (10 Marks)

OR

- 10 a. Explain low-duty cycle and wakeup concepts in WSN. (08 Marks)
b. Explain S-MAC protocol. (08 Marks)
c. Briefly explain energy problems on the MAC layer. (04 Marks)

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18EC744

Seventh Semester B.E. Degree Examination, July/August 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. Describe the simplified model of Symmetric encryption scheme and its ingredients. (15 Marks)
b. Explain Euclidean algorithm to find the GCD of two integers. (05 Marks)

OR

- 2 a. With suitable example, explain the Substitution Cipher. (08 Marks)
b. Explain the Transposition Cipher. (07 Marks)
c. Write the properties of Modular Arithmetic. (05 Marks)

Module-2

- 3 a. Describe the overall scheme for DES algorithm and its salient features. (15 Marks)
b. What are the strengths of DES algorithm? (05 Marks)

OR

- 4 a. Present an overview of the general structure of Advanced Encryption standard. (10 Marks)
b. Describe the AES key expansion algorithm. (10 Marks)

Module-3

- 5 a. Distinguish between Groups, Rings and Fields. (12 Marks)
b. Define Discrete Logarithms with an example. (08 Marks)

OR

- 6 a. With examples, describe Fermat's and Euler's theorem. (12 Marks)
b. Define the fields of the form $GF(P)$. (08 Marks)

Module-4

- 7 a. Present an overview of the RSA algorithm. (10 Marks)
b. Describe Elliptic Curve Cryptography. (10 Marks)

OR

- 8 a. Describe Diffie – Hellman key exchange algorithm. (10 Marks)
b. What are the basic principles of Public key Cryptography? (05 Marks)
c. What are the possible approaches to attack the RSA algorithms? (05 Marks)

Module-5

- 9 a. Explain LFSR and how the Shift register sequences are used in cryptography. (10 Marks)
b. Write note on : Design and Analysis of Stream Cipher. (10 Marks)

OR

- 10 Write short note on :
a. Geffe generator. (06 Marks)
b. A5 to encrypt GSM. (06 Marks)
c. NANOTEQ and RAMBUTAN. (08 Marks)

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18EC745

Seventh Semester B.E. Degree Examination, July/August 2022 Machine Learning with Python

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Pick a learning task of playing chess. Describe it as precisely as possible with relevant machine learning notations. Represent the target function 'f' a linear combination of board features of your choice. Play it repeatedly against itself that uses a fixed evaluation function. Discuss the main tradeoffs you considered in designing this learning task. Plot the design choices you made. (10 Marks)
- b. What are the elements of the version space? How are they ordered? What can be said about the meaning and sizes of S and G? Write G – to S ordering of hypotheses. (10 Marks)

OR

- 2 a. Implement Find-S and candidate elimination algorithms to solve the hypothesis of the given table and compare the outcome of hypotheses.

Origin	Manufacturing	Color	Decade	Type	Example
Japan	Honda	Blue	1980	Economy	+ve
Japan	Toyota	Green	1970	Sports	-ve
Japan	Toyota	Blue	1990	Economy	+ve
USA	Chrysler	Red	1980	Economy	-ve
Japan	Honda	White	1980	Economy	+ve
Japan	Toyota	Green	1980	Economy	+ve
Japan	Honda	Red	1990	Economy	-ve

(10 Marks)

- b. Describe the propose and use of Numpy and matplotlib libraries. Mention any 5 function/modules used in both. Draw a line in a diagram from position (0, 0) to (6, 250) using Numpy and Matplotlib libraries. (10 Marks)

Module-2

- 3 a. Give decision tree representation of the following Boolean function :
 - i) $(A \wedge B) \vee (C \wedge D)$ (10 Marks)
 - ii) $X \text{ xor } Y$. (05 Marks)
- b. Mention any 5 problems/situations where decision tree is best suited. (05 Marks)
- c. Write a short note on Occam's razor. (05 Marks)

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OR

- 4 a. Give Decision trees for the following set of training examples :

Day	Outlook	Temperature	Humidity	Wind	Play
D1	Sunny	Hot	High	Weak	No
D2	Sunny	Hot	High	Strong	No
D3	Overcast	Hot	High	Weak	Yes
D4	Rain	Mild	High	Weak	Yes
D5	Rain	Cool	Normal	Weak	Yes
D6	Rain	Cool	Normal	Strong	No
D7	Overcast	Cool	Normal	Strong	Yes
D8	Sunny	Mild	High	Weak	No
D9	Sunny	Cool	Normal	Weak	Yes
D10	Rain	Mild	Normal	Weak	Yes
D11	Sunny	Mild	Normal	Strong	Yes
D12	Overcast	Mild	High	Strong	Yes
D13	Overcast	Hot	Normal	Weak	Yes
D14	Rain	Mild	High	Strong	No

(10 Marks)

- b. Discuss practical issues in learning Decision tree.

(10 Marks)

Module-3

- 5 a. Explain appropriate problems for neural network learning with its characteristics. (10 Marks)
 b. Explain single perceptron with its representational power and training rule. (10 Marks)

OR

- 6 a. Explain and derive gradient descent algorithm. (10 Marks)
 b. Describe the derivation of back propagation rule. (10 Marks)

Module-4

- 7 a. Brief the relation between MAP and ML hypothesis with mathematical notation. Analyse the following statement by deriving appropriate equations :
 'Under our choice for $P(n)$ and $P(D/n)$, every consistent hypothesis has posterior probability of $(1 / |V_{SH, D}|)$ and every inconsistent hypothesis has posterior probability of 0, Every consistent hypothesis is therefore a MAP hypothesis. (10 Marks)
 b. Explain how minimum description length recommends choosing the hypothesis that minimizes the sum of two description lengths. (10 Marks)

OR

- 8 a. We consider a medical diagnosis task. We have knowledge that over the entire population of people, 0.8% have COVID. There exists a binary lab test that represents an imperfect indicator of this disease. The test returns a correct positive result in 98% of the cases in which the disease is present, and a correct negative results in 97% of the cases where the disease is not present.
 i) Suppose we observe a patient for whom the lab test returns a positive result. Calculate the posterior probability that this patient truly suffers from COVID.
 ii) Knowing that the lab test is an imperfect one, a second independent test is conducted. Calculate the posterior probabilities for COVID and \neg COVID given that the second test returned a positive result as well. (10 Marks)
 b. Maximum likelihood hypothesis is the one that minimizes the sum of the squared errors between the observed training values and the hypothesis predications. Justify the above statement with relevant equations. (10 Marks)

Module-5

- 9 a. Differentiate the error rate of the hypothesis over the sample available data and over unknown distribution. How good you can estimate one error provided the another one. (10 Marks)

- b. Consider the following data set.

0	+
+	0

Identify whether or not the following algorithms can classify this dataset with zero error. Justify answer :

- i) KNN with $k = 3$
ii) Regression. (05 Marks)
- c. What is curse of dimensionality? How this can be overcome by distance weighted KNN? (05 Marks)

OR

- 10 a. Describe k – nearest neighbor algorithm with its mathematical model and an example. (10 Marks)
- b. Explain the terminologies used in the phase ‘locally weighted regression’. Write your remarks on this algorithm. (10 Marks)

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