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18EC61

Sixth Semester B.E. Degree Examination, June/July 2023
Digital Communication

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Determine the Hibert transform of rectangular pulse :

$$\text{rect}(t) = \begin{cases} 1 & -\frac{1}{2} \le t \le \frac{1}{2} \\ 0, & \text{otherwise} \end{cases}$$ **(04 Marks)**

b. Express band pass signal S(t) in canonical form. Also derive the schemes for obtaining in phase and quadrature components of the band pass signal S(t) and vice-versa. **(08 Marks)**

c. Explain with necessary equations, the time–domain procedure for computational analysis of a band pass system driven by a band pass signal. **(08 Marks)**

OR

2 a. Consider a real base band signal $m(t) = 4\cos(2t) - 6\sin(3t)$ and a carrier signal $c(t) = \cos(100t)$. Determine a band pass signal s(t), analytic signal $s_l(t)$ and complex envelope $\tilde{s}(t)$. **(08 Marks)**

b. Draw the power spectra of :
i) NRZ polar signal
ii) Manchester signal. **(04 Marks)**

c. Illustrate HDB3, B8ZS and B3ZS signaling schemes and mention its applications. **(08 Marks)**

Module-2

3 a. Obtain the maximum likelihood decision rule for the signal detection problem. **(10 Marks)**

b. Derive the expressions for mean and variance of the correlator outputs. Also show that the correlator outputs are statistically independent. **(10 Marks)**

OR

4 a. Using the Gram-Schmidt orthogonalization procedure, find a set of orthonormal basis functions to represent the three signals $S_1(t)$, $S_2(t)$ and $S_3(t)$ shown in Fig.Q4(a). Also express each of these signals interms of the set of basis functions.

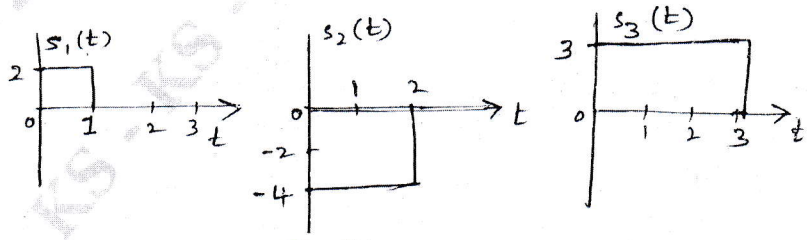

Fig. Q4 **(10 Marks)**

b. With a neat diagram, explain the correlation receiver. **(10 Marks)**

Module-3

5 a. With necessary expressions and block diagrams, explain the generation and coherent detection of QPSK signals. Also mention the shortcomings of QPSK and solution for the same. **(10 Marks)**

b. Define bandwidth efficiency. Tabulate and comment on the bandwidth efficiency of M-ary PSK signals for different values of M. **(04 Marks)**

c. What is the advantage of M-ary QAM over M-ary PSK system? Obtain the constellation of QAM for M = 4 and draw signal space diagram. **(06 Marks)**

OR

6 a. Derive an expression for probability of error of BFSK technique. Also draw the black diagrams of BFSK transmitter and coherent BFSK receiver. **(10 Marks)**

b. With a neat block diagram, explain the generation and optimum detection of DPSK signals. **(10 Marks)**

Module-4

7 a. With a neat block diagram, explain the digital PAM transmission through band limited base band channels. Also obtain an expression for inter symbol interference. **(10 Marks)**

b. Explain the need for precoder in a duobinary signaling. Consider a binary sequence 1110100100011101 is given as an input to the pre coder whose output is used to modulate a duobinary transmitting filter. Obtain the pre coded sequence, transmitted amplitude levels, the received signal levels and the decoded sequence. **(08 Marks)**

c. State the Nyquist condition for zero ISI. **(02 Marks)**

OR

8 a. What is a zero forcing equalizer? With a neat block diagram, explain the operation of linear transversal filter. **(08 Marks)**

b. Explain the design of band limited signals with controlled ISI. **(08 Marks)**

c. Write a note on eye diagram. **(04 Marks)**

Module-5

9 a. With a neat diagram, explain the model of a spread spectrum digital communication system. **(08 Marks)**

b. Explain the generation and demodulation of direct sequence spread spectrum signals with necessary equations and block diagram. **(08 Marks)**

c. A direct sequence spread – spectrum signal is designed so that the power ratio PR/PN at the intended receiver is 10^{-2}. If the desired $E_b/N_0 = 10$ for acceptable performance, determine the maximum value of the processing gain. **(04 Marks)**

OR

10 a. With a neat bock diagram, explain the frequency hopped spread spectrum. **(06 Marks)**

b. With a neat diagram, explain the IS – 95 reverse link. **(10 Marks)**

c. Write a note on law detectability signal transmission as an application of DSSS. **(04 Marks)**

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18EC62

Sixth Semester B.E. Degree Examination, June/July 2023
Embedded Systems

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 different registers of ARM CORTEX-M3 and mention their use. Explain the use of link register with an illustration. **(08 Marks)**

b. Explain Program Status Register (PSR) configuration. Illustrate how to access different subdivisions of PSR. **(06 Marks)**

c. Explain exceptions and interrupts of ARM CORTEX-M3. **(06 Marks)**

OR

2 a. Explain the operation modes of CORTEX-M3 with a block diagram. **(08 Marks)**

b. Explain CORTEX-M3 stack implementation for push and pop operations. **(06 Marks)**

c. Explain reset sequence of CORTEX-M3 why LSB of reset vector address is set to 1. **(06 Marks)**

Module-2

3 a. Explain following instruction of ARM CORTEX-M3 with suitable illustration:
(i) BIC (ii) SBFX (iii) REVSH (iv) LDRH **(08 Marks)**

b. Write an assembly language program to find sum of all even numbers in a given array of 10 numbers. **(06 Marks)**

c. Explain conditional execution using IT instructions with an example. **(06 Marks)**

OR

4 a. Explain all shift and rotate instructions of CORTEX-M3 with illustration. How rotate left operation can be implemented? **(10 Marks)**

b. Write an assembly language program to determine the parity of a 32 bit number. If even parity store 00h in a memory location otherwise store FFh in the location. **(06 Marks)**

c. Assume R0 = 0X12345678, R1 =0XFEDCBA12. Write the result after executing following instructions:
(i) BFC.W R0, #8, #16
(ii) UBFX.W R0, R1, #4, #8
(iii) BFI.W R1, R0, #8, #16
(iv) REVSH R1, R0 **(04 Marks)**

Module-3

5 a. Explain Big Endian and little Endian operation and give examples. **(06 Marks)**

b. With a diagram, explain SRAM cell implementation and its working. Give comparison between SRAM and DRAM cells. **(08 Marks)**

c. Explain the sequence of operation for communicating with an I2C slave device. **(06 Marks)**

OR

6 a. Give comparison between RISC and CISC. (06 Marks)
b. With a circuit diagram, explain how input and output circuits of a processor can be isolated. (06 Marks)
c. Explain SPI Bus interfacing and sequence of operation for communicating with a SPI device. (08 Marks)

Module-4

7 a. Explain characteristics of an embedded system with examples for each. (06 Marks)
b. Explain state machine model (FSM) by considering automatic seat belt warning system. (08 Marks)
c. Discuss advantages and drawbacks of super loop based firmware design approach. (06 Marks)

OR

8 a. Explain any six nonoperational quality attributes. Explain product life cycle curve. (10 Marks)
b. Design an automatic tea/coffee vending machine based on FSM model for the following requirement:
The tea/coffee vending is initiated by user inserting a 5 rupees coin. After inserting coin, the user can either select 'Coffee' or 'Tea' or press 'Cancel' the order and take back the coin. (06 Marks)
c. Explain the assembly language to machine language conversion process with block diagram. (04 Marks)

Module-5

9 a. Explain monolithic and micro kernels with suitable example for each. (06 Marks)
b. Explain task, process and threads. (08 Marks)
c. Three processes with process IDs P1, P2, P3 with estimated completion time 10, 5, 7 ms respectively enter the ready queue together in order P1, P2, P3. Calculate waiting time and turn around time for each process and average waiting time and TAT. (Assume there is no I/O waiting for the processes) (06 Marks)

OR

10 a. Explain different conditions that favour deadlock. Explain techniques to detect and prevent deadlock. (08 Marks)
b. With a block diagram, explain the concept of counting semaphore. Give real world example. (08 Marks)
c. Explain the advantages of simulation based debugging. (04 Marks)

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18TE62

Sixth Semester B.E. Degree Examination, June/July 2023
Microwave Theory and Antenna

Time: 3 hrs. Max. Marks: 100

Note: 1. ***Answer any FIVE full questions, choosing ONE full question from each module.***
2. ***Use of Smith chart is permitted.***

Module-1

1 a. Explain with a neat diagram, the bunching process and mechanism of oscillation of Reflex klystron oscillator. **(08 Marks)**

b. A load impedance of $Z_\ell = 60 - j80\ \Omega$ required to be matched to a 50Ω coaxial line by using a short circuited stub of length 'ℓ' located at a distance 'd' from the load. The wavelength of operations is 1mt. Find the length 'ℓ' and position'd' of the stub using Smith chart. **(08 Marks)**

c. A transmission line has a characteristics impendence of 75 + j0.01Ω. and it is terminated is a load impedance of 70 + j50Ω. Find i) Reflection coefficient (Γ) and ii) Transmission coefficient (T). **(04 Marks)**

OR

2 a. Derive the transmission line equations by the method of distributed circuit theory. **(10 Marks)**

b. A Reflex Klystron oscillator operates at the peak mode of n = 2 with $V_0 = 280V$ ' $I_0 = 22mA$ and $V_1 = 30V$. Determine: i) The input Power 'P_{dc}' ii) The output power P_{RF} iii) efficiency 'η'. **(06 Marks)**

c. Define SWR and give relationship between SWR and Reflection coefficient. **(04 Marks)**

Module-2

3 a. List the properties of S – parameter? State and prove the symmetry property of S – matrix. **(08 Marks)**

b. Derive an expression for Input reflection coefficient of a two port Network with mismatched load. **(06 Marks)**

c. The S-parameter of a two port Network are
$S_{11} = 0.2\angle 0^\circ$; $S_{22} = 0.1\angle 0^\circ$; $S_{12} = 0.6\angle 90^\circ$; $S_{21} = 0.6\angle 90^\circ$.
i) Prove that Network is Reciprocal but not lossless ii) Calculate the return loss at Port – 1 when port – 2 in short circuited. **(06 Marks)**

OR

4 a. With a neat diagram, explain the working of precision type variable attenuator and write necessary equations. **(08 Marks)**

b. With a neat sketch, explain the properties and working of magic Tee and obtain its S – matrix. **(08 Marks)**

c. A matched Isolator has Insertion loss of 0.5dB and an isolation loss of 25dB.Relate and Calculate the above losses interms of S – parameters. **(04 Marks)**

Module-3

5 a. Explain the field pattern of a microstrip line with neat diagram. Derive expression for characteristic impedance Z_0 for w/h >> 1 and w/h << 1. **(08 Marks)**

b. A microstrip line has the following parameter : $\epsilon_r = 5.23$, h = 7mils ; t = 2.8 mils ; w = 10mils. Find the characteristics impedance of the microstrip line. **(04 Marks)**

c. Explain with a diagram the construction of a Parallel strip line. Give expression for distributed parameter of the line. **(08 Marks)**

OR

6 a. Explain the following terms as related to antenna system i) Radiation pattern ii) HPBW iii) Beam efficiency. **(06 Marks)**

b. Define Directivity of Antenna. Obtain relationship between directivity and beam area. Prove that smaller the beam area larger is Directivity. **(10 Marks)**

c. The power received by the receiving antenna at a distance of 0.5km over a freespace at a frequency of 1GHz is 10.8mW. Estimate the power radiated by the transmitting Antenna if the gain of transmitting the receiving antenna is 25dB and 20dB respectively. **(04 Marks)**

Module-4

7 a. State and prove power theorem and explain its applications to an Isotropic source. **(06 Marks)**

b. Derive expression for total in case of two isotropic point sources placed ½ distances a part and fed with power of equal magnitude and phase. Draw the pattern. **(10 Marks)**

c. A source has cosine radiation intensity pattern that is $U = U_m \text{Cos}\ \theta$ over $0 \leq \theta \leq n/2$ and $0 \leq \theta \leq 2\pi$. Determine directivity 'D'. **(04 Marks)**

OR

8 a. Derive the expression for radiation resistance of short electric Dipole. **(08 Marks)**

b. Explain the concept of principle of pattern multiplication with an example. **(06 Marks)**

c. Find the power radiated and directivity 'D' for the radiation intensity $U = U_m \text{Cos}^2\theta\ \text{Sin}^3\phi$ for $0 \leq \theta \leq \pi$; $0 \leq \phi \leq \pi$. **(06 Marks)**

Module-5

9 a. Classify the loop Antennas on the basis of the physical dimension. Derive an expression for the radiation resistance of small loop antenna. **(06 Marks)**

b. Classify the horn Antenna based on the direction of the flaring angle. Explain about Rectangular Horn Antenna with a neat diagram. **(08 Marks)**

c. Determine Directivity 'D' of the rectangular Horn Antenna whose height is 6.5cm and width of mouth is 7cm. It operated at 8.2 GHz with aperture efficiency of 65%. **(06 Marks)**

OR

10 a. Outline the practical design consideration of the mono filar axial mode Helical Antenna with a neat diagram and necessary equations. **(08 Marks)**

b. Explain the constructional features of Yogi-Uda array antenna. Draw the radiation pattern. **(08 Marks)**

c. Design an 'N' turn circular loop antenna with radiation resistance of 36Ω and antenna diameter of 0.04. **(04 Marks)**

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18EC63

Sixth Semester B.E. Degree Examination, June/July 2023
Microwave and Antenna

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 limitations of conventional microwave tubes? Discuss how these limitations can be reduced? **(06 Marks)**

b. A transmission line has following parameters :
$R = 2\Omega/m$, $G = 0.5$mho/m, $f = 1$ GHz, $L = 8$nH/m, $c = 0.23$pF.
Calculate :
i) The characteristic impedance
ii) The propagation constant. **(06 Marks)**

c. Explain Suflex Klystron oscillator with neat block schematic and mode curves. **(08 Marks)**

OR

2 a. Derive the equation of transmission line and discuss its possible solution. **(10 Marks)**

b. List the characteristics of smith chart. **(05 Marks)**

c. A certain transmission line has a characteristics impedance of 75 + j0.01ohms and is terminated in a load impedance of 70 + j50ohms. Compute the reflection coefficient, transmission coefficient and standing wave ratio. **(05 Marks)**

Module-2

3 a. Derive the S-matrix representation for multiport network and using this derive the S-matrix solution for E–plane T Junction. **(10 Marks)**

b. Explain different types of attenuators, with its neat schematic diagram. **(10 Marks)**

OR

4 a. List the characteristics of magic – T when all the ports are terminated with matched load. Also derive the S – matrix relation along with its schematic. **(10 Marks)**

b. In a H – plane T Junction, compute power delivered to the loads of 40ohms and 60ohms connected to arms 1 and 2 when a 10MW power is delivered to the matched port 3. Choose characteristic impedance $Z_0 = 50\Omega$. **(06 Marks)**

c. Example briefly phase shifter. **(04 Marks)**

Module-3

5 a. A certain micro strip line has the following parameters : $\varepsilon_r = 5.23$, $h = 7$ mils, $t = 2.8$ mils and $w = 10$mils. Calculate the characteristic impedance of the line. **(04 Marks)**

b. Define the following terms related to antenna with relevant equation :
i) Directivity
ii) Field pattern
iii) Beam efficiency. **(06 Marks)**

c. Determine the directivity of the system if radiation intensity is given by $U = U_m \sin\theta \sin^2\phi$. When $0 \le \theta < \pi$ and $0 \le \phi < \pi$, using :
i) Exact method and
ii) Approximate method. **(10 Marks)**

OR

6 a. A lossless parallel strip line has a conducting strip width W. The substrate dielectric separating the two conducting strip has a relative dielectric constant ε_{rd} of 6 and a thickness d of 4mm calculate :

i) the squired width w of the conducting strip in order to have a characteristic impedance of 50Ω.

ii) Strip line capacitance

iii) The strip line inductance

iv) Phase velocity of the have in parallel strip line. **(10 Marks)**

b. Explain radio communication link and derive its relation interms of received and transmitted power. **(06 Marks)**

c. Compute the power received by the receiver antenna kept at a distance of 100km by transmitter radiating at 3MHz. Assume $G_T = 40$ and $G_R = 15$ and $P_T = 1000$ KW. **(04 Marks)**

Module-4

7 a. Obtain the field pattern for two point source situated symmetrically with respect to the origin. Two sources are fed with equal amplitude and equal phase signals. Assume distance between two sources = $\lambda/2$. **(10 Marks)**

b. Derive the expression for radiation resistance of short dipole with uniform current. **(10 Marks)**

OR

8 a. Linear antenna consists of 04 isotropic sources. The distance between element is $\lambda/2$. The power is applied with equal amplitude and in phase. Also compute HPBW and FNBW. **(10 Marks)**

b. Starting from electric and magnetic potential obtain the far field components for a short dipole. **(10 Marks)**

Module-5

9 a. Derive the radiation resistance of circular loop of any radius 'a'. **(10 Marks)**

b. Find the length L, H – plane aperture and flare angle θ_E and θ_H of pyramidal horn for which E – plane aperture is 10λ. Horn is fed by a rectangular wave guide with TE_{10} Mode. Assume $\delta = 0.2\lambda$ in E – plane and 0.375λ in H – plane. Also find E – plane, H – plane beam width and directivity. **(10 Marks)**

OR

10 a. Briefly explain helical antenna with its helical geometry. **(06 Marks)**

b. Explain different types of horn antenna with schematic diagram. **(08 Marks)**

c. Explain the construction details of Yogi-uda array. **(06 Marks)**

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18TE63

Sixth Semester B.E. Degree Examination, June/July 2023
Computer Communication Network

Time: 3 hrs. Max. Marks: 100

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

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.

Module-1

1	a.	Name the four basic network topologies and describe any two of the same.	**(08 Marks)**
	b.	Compare circuit switched network with packet switched network.	**(08 Marks)**
	c.	Write the two principles of protocol layering.	**(04 Marks)**
		OR	
2	a.	Show the layer representation of the TCP/IP model and explain each of them.	**(08 Marks)**
	b.	Explain the concept of spanning tree algorithm with example.	**(08 Marks)**
	c.	What are the advantages of switches?	**(04 Marks)**

Module-2

3	a.	Describe the services of the DLC layer.	**(04 Marks)**
	b.	Explain the ARP packet format with neat diagram.	**(08 Marks)**
	c.	Discuss the character stuffing and bit stuffing with examples.	**(08 Marks)**
		OR	
4	a.	With neat diagram, explain the working of pure aloha protocol.	**(06 Marks)**
	b.	Explain the layered model of the Bluetooth with diagram.	**(08 Marks)**
	c.	Enumerate the concept of polling method.	**(06 Marks)**

Module-3

5	a.	With neat diagram, explain the operation of datagram approach.	**(08 Marks)**
	b.	Differentiate between classful and classless addressing.	**(04 Marks)**
	c.	Explain the DHCP protocol with message format.	**(08 Marks)**
		OR	
6	a.	Give a brief overview of IPV4 datagram.	**(08 Marks)**
	b.	With an example, explain the distance vector routing algorithm.	**(08 Marks)**
	c.	Write a short note on subnetting and supernetting.	**(04 Marks)**

Module-4

7	a.	With a suitable flow diagram, explain the three way handshaking used in TCP protocol.	**(08 Marks)**
	b.	Explain sliding window in circular format.	**(06 Marks)**
	c.	Write a FSMs for the stop and wait protocol.	**(06 Marks)**

OR

8	a.	List the general services provided by UDP.	**(06 Marks)**
	b.	Discuss the TCP segment format.	**(08 Marks)**
	c.	Explain the domains of a network layer and a transport layer.	**(06 Marks)**

Module-5

9	a.	Define the data flow characteristics.	**(04 Marks)**
	b.	With neat diagram, explain the FIFO queuing.	**(08 Marks)**
	c.	Write an algorithm for simple leaky bucket implementation.	**(08 Marks)**

OR

10	a.	Explain the architecture of world wide web.	**(08 Marks)**
	b.	Discuss the basic model of FTP.	**(06 Marks)**
	c.	How TCP/IP uses a DNS client and a DNS server to map a name to an address.	**(06 Marks)**

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18EC646

Sixth Semester B.E. Degree Examination, June/July 2023
Python Application Programming

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 concept of type conversion functions and math functions in python with examples. **(10 Marks)**

b. Write a program which prompts the user for a Celsius temperature, convert the temperature to Fahrenheit, and print out the converted temperature. **(05 Marks)**

c. List any five features of python programming language. **(05 Marks)**

OR

2 a. List and give syntax of all python supported conditional statements. Write a python program to check whether given number is positive or negative or zero. **(10 Marks)**

b. Explain the rules of precedence used by python to evaluate an expression. **(05 Marks)**

c. Write a program to prompt for a score between 0.0 and 1.0. If the score is out of range, print an error message. If the score is between 0.0 and 1.0, print a grade using the following table:

Score	>= 0.9	>= 0.8	>= 0.7	>= 0.6	< 0.6
Grade	A	B	C	D	F

(05 Marks)

Module-2

3 a. Write a python code which repeatedly reads numbers until the user enters "done". Once "done" is entered, print out the total, count, and average of the numbers. If the user enters anything other than a number, detect their mistakes using try and except and print an error message and skip to the next number. **(10 Marks)**

b. List and explain with example any five built in string manipulation functions supported by python. **(10 Marks)**

OR

4 a. Define a string. How it can be traversal through using looping statement? **(06 Marks)**

b. Explain file open, file close, file read and file write concepts in python with examples. **(08 Marks)**

c. Write a program to read through a file and print the contents of the file (line by line) all in upper case. **(06 Marks)**

Module-3

5 a. What is dictionary? Write a python program that accepts a sentence and build dictionary with LETTER, DIGIT, UPPER CASE, LOWER CASE as key value and their count in the sentences as values.

Example: Sentence = 'VTU@123.e-Learning'

d = {"LETTER" : 12, "DIGITS" : 3, "UPPER CASE" : 4, "LOWER CASE" :8} **(10 Marks)**

b. Compare and contrast tuples with lists. Explain the following operations in tuples:
   (i) Sum of two tuples
   (ii) Slicing operators
   (iii) Comparison of two tuples
   (iv) Assignments to variables **(10 Marks)**

OR

6 a. Describe any two list operations and list methods. Write a python program to accept 'n' numbers from user, find sum of all even numbers and product of all odd numbers in entered list. **(10 Marks)**

b. Illustrate the use of regular expressions for:
   (i) Extracting data
   (ii) Character matching
   (iii) Combining searching and extracting **(10 Marks)**

Module-4

7 a. What is class? How to define a class in python? **(05 Marks)**

b. Write a definition for a class named circle with attributes center and radius, where center is a point object and radius is a number. Instantiate a circle object that represents a circle with its center at (150, 100) and radius 75. Write a function named point_in_circle that takes a circle and a point and returns True if the point lies in or on the boundary of the circle. **(10 Marks)**

c. Distinguish between pure functions and modifiers with example. **(05 Marks)**

OR

8 a. Illustrate how _init_ method is invoked when an object is initiated. **(05 Marks)**

b. What does the keyword self in python mean? Explain with example. **(05 Marks)**

c. What is operator overloading and type-based dispatch? Write a python code to add or increment the time based on the type of second parameter. If the second parameter is time then perform addition. If it is integer then perform increment operation. **(10 Marks)**

Module-5

9 a. What is socket? Explain how socket connection can be established to the internet using python code over the TCP/IP connection and the http protocol to get the web content. **(08 Marks)**

b. Write a note on XML. Write a python program to retrieve a node present in XML. **(08 Marks)**

c. What is service-oriented architecture? List the advantages of the same. **(04 Marks)**

OR

10 a. Brief on structured query language, with suitable python program explain functions involved in creation of database table in python. **(08 Marks)**

b. Demonstrate with the python program:
   (i) How to retrieve an image over HTTP?
   (ii) How to retrieve web pages with Urllib? **(08 Marks)**

c. Compare and contrast the Java Script object notation and extensible markup language (JSON and XML). **(04 Marks)**

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