CBCS SCHEME

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18EC61

Sixth Semester B.E. Degree Examination, Dec.2024/Jan.2025
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. Define Hilbert transform. What are the applications of Hilbert transform? Prove that a signal g(t) and its Hilbert transform $\hat{g}(t)$ are orthogonal over the entire time interval $(-\infty, \infty)$. **(10 Marks)**

b. Derive the expression for the complex low pass representation of band pass system. **(10 Marks)**

OR

2 a. Express bandpass signal s(t) in canonical form. Also explain the scheme for deriving the inphase and quadrature components of the bandpass signal s(t). **(10 Marks)**

b. For a binary sequence 0100000001011 construct:
(i) RZ bipolar format (ii) Manchester format (iii) B3ZS format
(iv) B6ZS format (v) HDB3 format **(10 Marks)**

Module-2

3 a. Explain the geometric representation of set of M energy signals as linear combination of N orthonormal basis functions. Illustrate for the case N = 2 and M = 3 with necessary diagrams and expressions. **(10 Marks)**

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

OR

4 a. Apply Gram-Schmidt procedure to obtain an orthonormal basis for the signals $s_1(t)$, $s_2(t)$ and $s_3(t)$ as shown in Fig.Q4(a). Also express each of these signals interms of the set of basis functions.

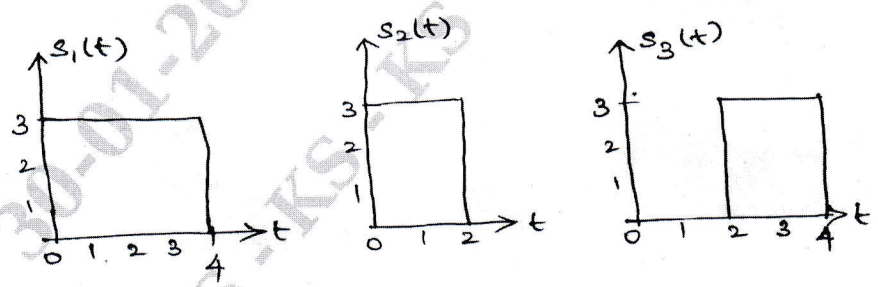

Fig.Q4(a) **(10 Marks)**

b. Explain the correlation receiver and matched filter receiver with relevant diagrams. **(10 Marks)**

Module-3

5 a. Derive the expression for average probability of error for FSK using coherent detection. Explain transmitter and coherent receiver of FSK. **(10 Marks)**

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

OR

6 a. Using block diagram, explain the generation and detection of QPSK signal. **(10 Marks)**

b. Derive the expression for error probability of binary PSK using coherent detection. **(06 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. **(04 Marks)**

Module-4

7 a. State and prove Nyquist condition for zero ISI. **(08 Marks)**

b. Explain the digital PAM transmission system. Also derive the expression for Inter Symbol Interference (ISI). **(08 Marks)**

c. With neat diagram and relevant expression, explain the concept of adaptive equalization. **(04 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 need for precoder in a duobinary signaling. The binary data 001101001 are applied to the input of a duobinary system. Construct the duo binary coder output and corresponding receiver output. Assume that precoder is used. **(08 Marks)**

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

Module-5

9 a. Explain the model of a spread spectrum digital communication system. **(06 Marks)**

b. Illustrate the working of direct sequence spread spectrum transmitter and receiver with block diagram, waveforms and expressions. **(10 Marks)**

c. What is a PN sequence? What are the properties of maximum length sequences? **(04 Marks)**

OR

10 a. Explain frequency hop spread spectrum with neat block diagram. **(10 Marks)**

b. Illustrate the CDMA system forward link based on IS-95. **(10 Marks)**

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18TE62

Sixth Semester B.E. Degree Examination, Dec.2024/Jan.2025
Microwave Theory 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. Derive transmission line equations and solution for the same. **(10 Marks)**

b. With neat diagrams explain the working principle and mechanism of oscillation of a reflex kystron oscillator. **(10 Marks)**

OR

2 a. Obtain an equation for line impedance of a transmission line. **(07 Marks)**

b. Derive an expression for reflection eco-efficient with proper definition. **(05 Marks)**

c A load impedance of $Z_L = 60 - j80\Omega$ is required to be matched to a 50Ω coaxial cable. Design a single stub matching using smith chart, where the wavelength of the operation is 1 meter. **(08 Marks)**

Module-2

3 a. Show how the S-matrix is derived for a multiport network. **(06 Marks)**

b. Drive the properties of S-parameters. **(08 Marks)**

c. Two transmission lines are meeting at a plane PP! Derive its S-matrix in terms of impedances, where the transmission line 1 has impedance Z_1 and transmission line 2 has impedance Z_1 respectively. **(06 Marks)**

OR

4 a. With a neat figure explain the operation of a two hole directional coupler and also derive its S-matrix. **(10 Marks)**

b. Discuss the construction and operation of a magic tee and also derive its S-matrix. **(10 Marks)**

Module-3

5 a. Discuss radiation loss in a microstripline. **(05 Marks)**

b. A lossless parallel strip line has conducting strip width 18 mm, separated by quartz dielectric with permittivity 3.8 having thickness 2.5 mm. The conductivity of copper is 5.8×10^7 mho/m and that of quartz is 2×10^{-4} mho/m. The frequency of operation is 12 GHz. Determine :

i) Characteristic impedance
ii) Stripline inductance
iii) Stripline capacitance
iv) Series resistance

c. v) Phase velocity. **(10 Marks)**

Explain co-planar stripline with a neat figure. **(05 Marks)**

OR

6 a. With necessary equations explain the following :
i) HPBW
ii) Beam solid angle
iii) Gain
iv) Radiation resistance. **(08 Marks)**

b. For a radio communication link derive FRIIS transmission formula. **(07 Marks)**

c. What is the radiation resistance of an antenna which has an efficiency of 85% and a loss resistance of 12 Ω. Calculate the directivity if the gain is 20. **(05 Marks)**

Module-4

7 a. State and prove power theorem. **(06 Marks)**

b. Derive an equation for array factor of 'n' isotropic point sources of equal amplitude and spacing. **(10 Marks)**

c. The radiation intensity pattern is given by $u = u_m \sin^2\theta$ find the directivity. **(04 Marks)**

OR

8 a. A linear array consists of 4 isotropic point sources, the distance between adjacent elements is $\lambda/2$ with phase difference (δ) of zero. Obtain the field pattern and find out BWFN and HPBW. **(10 Marks)**

b. Derive an expression for radiation resistance of a short dipole. **(10 Marks)**

Module-5

9 a. The radius of a circular loop antenna is 0.02λ. How many turns of the antenna will give radiation resistance of 35 Ω. **(10 Marks)**

b. Explain rectangular horn antenna in detail with neat figures. Also give the respective equations for E and H plane rectangular horn antennas. **(10 Marks)**

OR

10 a. Discuss log-periodic antenna in detail with a neat figure and necessary equations. **(08 Marks)**

b. Explain a three element Yagi-Uda array with figure. **(05 Marks)**

c. Give the properties of parabolic reflectors. **(07 Marks)**

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18EC63

Sixth Semester B.E. Degree Examination, Dec.2024/Jan.2025
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. Explain the operation of Reflex Klystron with the help of neat sketch. **(10 Marks)**

b. Derive the general transmission line equation to find voltage and current on the line interms of Position 'Z' and time 't'. **(10 Marks)**

OR

2 a. Explain the mechanism of oscillation of reflex Klystron. **(08 Marks)**

b. Define reflection coefficient. Derive the equation for reflection coefficient at the load. **(06 Marks)**

c. A transmission line has a characteristic impedance of $50 + j0.01\Omega$ and terminated in a load impedance of $73 - j42.5\Omega$. Calculate :
i) Reflection coefficient
ii) SWR
iii) Transmission coefficient. **(06 Marks)**

Module-2

3 a. Mention the other name of Magic.Tee. Derive S matrix of Magic Tee. **(08 Marks)**

b. With neat diagram, explain the working of precision type variable attenuator. **(06 Marks)**

c. Discuss the following properties of S parameters i) Symmetry of [S] for a reciprocal network. **(06 Marks)**

OR

4 a. Derive the S matrix of E – plane. **(06 Marks)**

b. With a neat diagram, explain the working of precision rotary phase shifter. **(10 Marks)**

c. Derive Smatrix for multiport network. **(04 Marks)**

Module-3

5 a. Derive the characteristic impedance of microstrip line. **(06 Marks)**

b. Define the following terms with respect to antenna :
i) Beam area
ii) Radiation intensity
iii) Beam efficiency
iv) Directivity
v) Radiation resistance. **(10 Marks)**

c. A certain microstrip has following parameters :
$\epsilon_r = 5.23$, h = 7 mils, t = 2.8 mils, w = 10 mils. Calculate the characteristic impedance Z_0 of the line. **(04 Marks)**

OR

6 a. Explain coplanar strip line and shielded strip line. **(10 Marks)**

b. A coplanar strip line carries an average power of 250 MW and a peak current of 100mA. Determine the characteristic impedance of the coplanar strip line. **(04 Marks)**

c. Define effective aperture. Obtain the relationship between directivity and effective aperture. **(06 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 the distance between two sources $d = \lambda/2$. **(06 Marks)**

b. A source has radiation intensity power pattern given by :

i) $U = U_m \sin^2 \theta \quad 0 < \theta < \pi$

$0 < \phi < 2\pi$

ii) $U = U_m \cos^2 \theta \quad 0 < \theta < \pi/2$

$0 < \phi < 2\pi$. **(08 Marks)**

c. Derive an expression for radiation resistance of a short electric dipole. **(06 Marks)**

OR

8 a. Obtain field expression of two isotropic point source of same amplitude but opposite phase. **(06 Marks)**

b. Explain the principle of pattern multiplication with an example. **(08 Marks)**

c. Prove that directivity for a source with unidirectional pattern $U_m \cos^n \theta$ where 'n' can be any number, expressed as $D = 2(n + 1)$. **(06 Marks)**

Module-5

9 a. Obtain the expression for radiation resistance of small loop antenna. **(08 Marks)**

b. Explain Yagi – Uda array with help of diagram. **(06 Marks)**

c. Calculate BWFN, HPBW, directivity and power gain of a uniformly illuminate circular aperture of diameter 8λ. **(06 Marks)**

OR

10 a. Draw the structure of a pyramidal horn antenna. Use the principle of equality of path length and bring out the optimum horn dimension. **(06 Marks)**

b. Determine the length L, H plane aperture and flare angles θ_E and θ_H of a pyramidal horn for which E-plane aperture $a_1 = 10\lambda$. The horn is fed by a rectangular wave guide with TE_{10} mode. Let $\delta = 0.2\lambda$ in E-plane and 0.375λ in the H-plane.

i) What are the beam widths

ii) What is directivity? **(08 Marks)**

c. Calculate BWFN, HPBW, directivity and power gain of a uniformly illuminated circular aperture of diameter 8λ. **(06 Marks)**

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18TE63

Sixth Semester B.E. Degree Examination, Dec.2024/Jan.2025
Computer Communication 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 responsibilities of each layer in TCP/IP protocol suite with the layer diagram. **(10 Marks)**

b. Explain the four levels of addressing used in TCP/IP with examples. **(06 Marks)**

c. An image with 1024 × 768 pixels has 3 bytes/pixel. Assume image is uncompressed. Solve for transmission time for
i) 56 kbps modem channel
ii) 1 mbps cable and
iii) 10 mbps Ethernet. **(04 Marks)**

OR

2 a. Illustrate the encapsulation and decapsulation representation in the TCP/IP model. **(06 Marks)**

b. Compare various physical topologies in a computer network. List out advantages and disadvantages of each topology. **(08 Marks)**

c. Explain the following connecting devices
i) Hub ii) Link layer switch iii) Router. **(06 Marks)**

Module-2

3 a. Explain ARP operation and a ARP packet format with a neat diagram. **(08 Marks)**

b. Apply bit stuffing and destuffing on the given bit stream :
000111111100 1111101000. Assume flag as 01111110. **(04 Marks)**

c. Explain with suitable diagram stop and wait ARQ protocol considering acknowledgement timer and sequence number. **(08 Marks)**

OR

4 a. Compare :
i) ALOHA and Slotted ALOHA ii) CSMA/CD and CSMA/CA **(08 Marks)**

b. Explain Reservation, polling and token passing in controlled access method. **(06 Marks)**

c. Explain Hidden station and exposed station problem and how RTS and CTS solve this problem. **(06 Marks)**

Module-3

5 a. An ISP is granted a block of addresses starting with 150.80.0.0/16. The ISP wants to distribute these blocks to 2600 customers as follows.
The first group has 200 medium size businesses ; each needs 16 addresses.
The second group has 400 medium size business ; each needs 8 address.
The third group has 2000 medium size business ; each needs 4 addresses, construct the sub block and give the slash notation for each sub block. Find out how many addresses are available after these allocations. **(08 Marks)**

b. Explain with diagram IPV4 datagram format. **(06 Marks)**

c. Explain the different classes of addresses in classful addressing. **(06 Marks)**

OR

6 a. Illustrate distance vector routing for the example shown in Fig Q6(a).

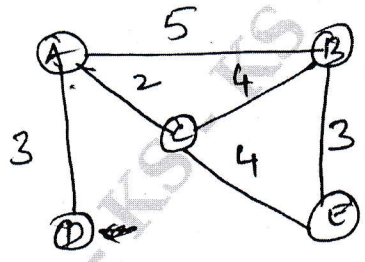

Fig Q6(a) **(06 Marks)**

b. Explain the two address approach in mobile host and the significance of home agent and foreign agent with diagram. **(08 Marks)**

c. Explain with diagram three phases of remote host and mobile host communication. **(06 Marks)**

Module-4

7 a. Explain three way handshaking for connection establishment and termination in TCP. **(08 Marks)**

b. The dump of a TCP header in hexadecimal format is : 053200217 000000001 00000000 500207FF 00000000. Find : i) source port number ii) Destination port number iii) sequence number iv) length of header v) type of the segment vi) window size. **(06 Marks)**

c. Compare TCP and UDP protocols. **(06 Marks)**

OR

8 a. A selective repeat sliding window protocol for a network with a bandwidth of 1 Gbps has to be designed. The average distance between sender and receiver is 5,000 km. Assume the average packet size = 50,000 bits and the propagation speed in the media is 2×10^8m. Determine the maximum size of the send and receive windows, the number of bits in the sequence number field (m) and an appropriate time out value for the timer. **(08 Marks)**

b. Explain :
i) windows in TCP ii) Flow control iii) TCP congestion control. **(12 Marks)**

Module-5

9 a. Explain the working of leaky bucket algorithm with the help of a diagram. **(06 Marks)**

b. Explain HTTP command and reply format. **(08 Marks)**

c. What is ONS? Differentiate between recursive and iterative query. **(06 Marks)**

OR

10 a. Explain the following protocols :
   i) Simple Mail Transfer Protocol
   ii) File transfer protocol
   iii) TELNET **(08 Marks)**

b. Explain format of query and response message in DNS. **(06 Marks)**

c. Computer A has 19.5MB to send on a Network and transmits the data in a burst at a rate of 6 Mbps. The maximum transmission rate across routes in the network is 4 Mbps. If computer A's transmission is shaped using a leaky bucket. Find the capacity of the bucket not to discard any data. **(06 Marks)**

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18EC646

Sixth Semester B.E. Degree Examination, Dec.2024/Jan.2025
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, math functions, Fruitful and void factions in python with examples. **(10 Marks)**

b. Predict the output and justify your answer for the following operations
i) 11%9 ii) 7.7//7 iii) (200 – 70)*10/5 iv) not 'False' v) 5*2**2. **(10 Marks)**

OR

2 a. 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 score is between 0.0 and 1.0, print a grade using the following table :
>= 0.9 : A
>= 0.8 : B
>= 0.7 : C
>= 0.6 : D
>= 0.6 : F **(10 Marks)**

b. Differentiate complier and interpreter. **(06 Marks)**

c. List the building blocks of program and explain each them. **(04 Marks)**

Module-2

3 a. List any five string methods of python and explain each of them with an example. **(10 Marks)**

b. Predict the output and justify your answer for the following python program.

```
def fun (a, b, c) :
Z = [0, 0, 0, 0, 0, 0, 0, 0, 0, 0]
for i in range (len (a)) :
z[i] = C* a[i] + b
return (z)
d = 2
e = [2, 5, 6, 8, 10, 15, 4, 3, 1,9]
f = 3
y = fun (e, d, f)
print ('y=' y)
print ('Extract='y[len(e) – 3 :])
```

(10 Marks)

OR

4 a. Write a program which repeatedly reads numbers until 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 mistake using try and except and print an error message and skip to the next number. **(10 Marks)**

b. List python functions used for file handling and explain each of them with examples. **(10 Marks)**

Module-3

5 a. For a given list T which contains the alphabets from 'a' to 'j', write a function called chop that takes a list T and modifies it, removing the first and last elements, and return None. Then write a function called middle that takes a list T and returns a new list that contains all excluding the first and last elements. Finally call these two function in the main program and print the return values. **(07 Marks)**

b. What is a list? Explain the concept of list slicing and list traversing with examples. **(06 Marks)**

c. Write a python program to read the string build a histogram using a dictionary to count occurrence of characters in a string and print the dictionary. **(07 Marks)**

OR

6 a. Applying the concept of Dictionaries and Tuples, write a python program which reads the file and computers the count of words present in the file and print the ten most common words in the file. **(10 Marks)**

b. Applying the concept of regular expression write a python program to search for lines that start with 'F' followed by 2 characters, followed by 'm:' and search for lines that having '@' sign between characters, the characters must be letter or number. **(10 Marks)**

Module-4

7 a. What is a Class? How to define a class in python? How to instantiate a class and how the class members are accessed? **(10 Marks)**

b. Write a definition for class named circle with attributes center and radius, where center is point object and radius is a number. Instantiate a circle object that represent 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 boundary of the circle. **(10 Marks)**

OR

8 a. Show using a python code how_ init_ method is involved when an object is initiated. Explain its working. **(10 Marks)**

b. What is types based dispatch? Write an add method for Time that works with either a Time object or an integer value. If the second operand is a Time, the method should invoke the add-time function to add the time value, if the second operand is a integer value the method should invoke the increment function to increment time by integer value and print the corresponding output. **(10 Marks)**

Module-5

9 a. Demonstrate with the help of python construct how to retrieve an image over HTTP and web pages with urllib. **(10 Marks)**

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

OR

10 a. Illustrate the concept of parsing JSON and parsing XML with python code. **(08 Marks)**

b. Compare and contrast the JavaScript Object Notation (JSON) and XML. **(04 Marks)**

c. Explain with python code, the concept of using JOIN to retrieve data in python. **(08 Marks)**