INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

INFORMATION TECHNOLOGY

QUESTION BANK

Course Name	:	**DATA COMMUNICATIONS**
Course Code	:	A40409
Class	:	II- B. Tech
Branch	:	Information Technology
Year	:	2016 – 2017
Course Coordinator	:	Mrs. J.Sravana
Course Faculty	:	Mrs. J.Sravana

OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

1. Group - A (Short Answer Questions)

S.No	QUESTION	Blooms Taxonomy Level	Course Outcome
	UNIT-I **INTRODUCTION TO DATA COMMUNICATIONS AND NETWORKING** **&** **SIGNALS, NOISE, MODULATION, AND DEMODULATION**		
1	List the components of data communication systems.	Remembering	2
2	Write the three criteria for an effective and efficient network.	Applying	2
3	Define protocol. Give the need for protocol.	Remembering	1
4	List the various standards institutes.	Remembering	1
5	Write the advantage of layered network architecture.	Applying	1
6	List the seven layers of osi-model.	Remembering	1
7	Define PDU.	Remembering	1
8	List the various data communication protocols.	Remembering	1
9	Explain TCP/IP.	Understanding	1
10	List the responsibilities of data link layer.	Remembering	1
11	Define encapsulation and decapsulation.	Remembering	1
12	Explain the need for standards institutes.	Understanding	1
13	Distinguish between peer to peer and client server networks.	Analyzing	1
14	List the various communication modes.	Remembering	2
15	Define signal to noise ratio. write its significance	Remembering	3
16	Define bit rate and baud .when does bit rate equal baud.	Remembering	3
17	Sketch the wave forms for ASK,PSK,QAM by taking an example	Applying	4

S.No	QUESTION	Blooms Taxonomy Level	Course Outcome
18	summarize the various network topologies	Understanding	2
19	List some services provided by the application layer.	Remembering	1
	UNIT-II **MULTIPLEXERS& TRANSMISSION MEDIA**		
1	Define multiplexing. List the types of multiplexing.	Remembering	2
2	Explain FDMA	Analyzing	4
3	Explain TDMA	Analyzing	4
4	List the advantages of multiplexing.	Remembering	4
5	Define the term concentrator in telecommunication.	Remembering	4
6	Explain STDMA.	Analyzing	4
7	Define the term transmission medium.	Remembering	5
8	List the types of transmission media?	Remembering	5
9	Differentiate guided media from unguided media?	Understanding	5
10	List the three major classes of guided media?	Remembering	5
11	Explain twisted pair cable with neat diagram.	Understanding	5
12	List the two types of twisted pair cables? Give the comparison.	Understanding	5
13	Explain about coaxial cable with neat diagram.	Understanding	5
14	Distinguish between rigid and flexible coaxial cables.	Understanding	5
15	List and sketch the various coaxial cable connectors	Remembering	5
16	Explain the construction of optical fiber cable with neat diagram	Understanding	5
17	Discuss the modes of propagation of light along optical channels	Understanding	5
18	Explain the significance of total internal reflection in optical fiber communication.	Understanding	5
19	What is the purpose of cladding in an optical fiber? Discuss its density relative to the core.	Understanding	5
20	List the advantages of optical fiber over twisted pair and coaxial cable.	Remembering	5
21	List the disadvantages of optical fiber as a transmission medium?	Remembering	5
22	Explain SONET.	Understanding	5
	UNIT-III **TELEPHONE INSTRUMENTS AND SIGNALS&THE TELEPHONE CIRCUIT**		
1	Define subscribers loop.	Remembering	6
2	Write about RJ-11 jack.	Applying	6
3	Define the terms tip and ring as connected to subscribers loop	Remembering	6
4	List the essential components of standard telephone set.	Remembering	6
5	Explain the use of loading coils in a telephone circuit?	Understanding	6
6	Explain about gain hits and drop outs.	Understanding	6
7	Sketch the block diagram of telephone set.	Applying	6
8	Explain DTMF.	Understanding	6
9	Write about dial pulses	Remembering	6
10	List the transmit and receive frequencies of cordless telephones.	Remembering	6
11	List the components of electronic telephone.	Remembering	6
12	Write about caller-ID.	Applying	6
13	Write about bridge taps.	Applying	6
14	What does 26H88 indicate as related to loading coils?	Understanding	6
15	Define loop resistance.	Remembering	6
16	List three types of cross talk	Remembering	6
17	Explain the purpose of an echo suppressor	Understanding	6
18	Explain the purpose of echo canceller	Understanding	6
19	Write about hybrid circuit.	Applying	6
20	Differentiate dB and dBm	Understanding	3

S.No	QUESTION	Blooms Taxonomy Level	Course Outcome
21	Write about ringing and ring back signal	Applying	6
22	List the types of line conditioning	Remembering	6
23.	Explain the significance of transmission parameters?	Understanding	6
	UNIT-IV		
	CELLULAR TELEPHONE SYSTEMS&DATA COMMUNICATIONS CODES, ERROR CONTROL, AND DATA FORMATS		
1	define cell and cluster	Remembering	6
2	Sketch the schematic diagram of a cellular telephone system.	Applying	6
3	Explain the term frequency reuse	Understanding	4
4	Differentiate hard handoff and soft handoff	Understanding	6
5	sketch the amps frequency spectrum	Applying	6
6	list the AMPS identification codes with their application	Remembering	6
7	list the modes/services offered by personal communications system	Remembering	6
8	List the differences between AMPS and NAMPS channels.	Remembering	6
9	write about HLR	Applying	6
10	Write about VLR.	Applying	6
11	Write about EIR.	Applying	6
12	List the advantages of PCS cellular system compared to a standard cellular system.	Remembering	6
13	Describe TDMA scheme used with USDC.	Remembering	6
14	list the advantages of digital TDMA over analog AMPS FDMA	Remembering	6
15	Write about sleep mode.	Applying	6
16	Describe E-TDMA scheme	Remembering	6
17	write about GSM	Applying	6
18	List the major components of GSM Architecture.	Remembering	6
19	List the advantages of satellite communication over mobile communication	Remembering	6
20	Write about Iridium system.	Understanding	6
21.	Define the terms data ,information and data transmission	Remembering	7
22	Define error control	Remembering	7
23	Define error correction	Remembering	7
24	Define error detection	Remembering	7
25	Define forward error correction. Mention any technique	Remembering	7
26.	Define character synchronization	Remembering	7
27	Define start bit and stop bit	Remembering	7
	UNIT-V		
	DATA COMMUNICATIONS EQUIPMENT		
1	Define data communications hardware	Remembering	7
2	Define data terminal equipment	Remembering	7
3	Define data communications equipment	Remembering	7
4	Describe the basic functions of a channel service unit	Understanding	7
5	Describe the basic functions of a digital service unit	Understanding	7
6	Define voice band data communications modem	Remembering	7
7	List the basic blocks of a voice band modem	Remembering	7
8	List the basic blocks of a asynchronous voice band modem	Remembering	7
9	Define modem synchronization	Remembering	7
10	Explain modem training	Understanding	7
11	Define the terms bis and terbo	Remembering	7
12	List the differences between cable modems and standard voice band modems	Remembering	7
13	List the four modem operational modes	Remembering	7

S.No	QUESTION	Blooms Taxonomy Level	Course Outcome
14	List the four types of commands used with the Hayes AT command set.	Remembering	8
15	Explain the purpose of scrambler and descrambler circuits	Understanding	8

2. Group - II (Long Answer Questions)

S.No	Question	Blooms Taxonomy Level	Course Outcome
	UNIT-I **INTRODUCTION TO DATA COMMUNICATIONS AND NETWORKING** **&** **SIGNALS, NOISE, MODULATION, AND DEMODULATION**		
1	Describe the architecture and functions of all layers in OSI model.	Remembering	1
2	a. Differentiate between bit, baud and bit rate .what are the conditions under which both of them become same. b. What is M-ary encoding? List the advantages.	Remembering	3
3	a) Discuss are the various functions of data link protocol? b) What is meant by a primary station and a secondary station?	Understanding	1
4	a) List and compare the basic data communications network topologies? b) What are the advantages of layered architecture?	Remembering	1
5	Explain the following: i) Peer-to-peer client/server model ii) Client/server model.	Understanding	1
6	Define protocol? Differentiate connection oriented and connection less protocol. b) Describe the following Network topologies i) Bus ii) Star iii) Mesh	Remembering	1
7	a) Explain Network components, functions and features. i) Protocol ii) Peer to Peer data communication iii) Serial and Parallel data transmission iv) Encapsulation and decapsulation	Understanding	1
8	a) List out and describe the functions of different components of a data communications circuit. b) What are the transmission modes of a data communication system? Explain them.	Remembering	2
	UNIT-II **MULTIPLEXERS& TRANSMISSION MEDIA**		
1	a) Discuss about wavelength division multiplexing in detail and mention its advantages and disadvantages. b) What is statistical TDM? Explain in what way it is advantageous as compared to standard TDM system	Understanding	4
2	a) With suitable sketches, explain about TDM digital hierarchy system. b) write about concentrators and explain the various switching techniques.	Applying	4
3	a) Discuss about the wave propagation in metallic transmission lines. b) Enumerate different losses that occur in metallic transmission lines and explain them with suitable sketches.	Understanding	5
4	a) list out the features of all six types of unshielded twisted pair cables b) What is the significance of the twisting in twisted pair cable? c) Explain about modal dispersion in optical fiber.	Understanding	5
5	a) Explain the characteristics of coaxial cables. b) What is the importance of critical angle with respect to optical fiber cable?	Understanding	5

S.No	Question	Blooms Taxonomy Level	Course Outcome
6	a) Distinguish between unshielded twisted pair and shielded twisted pair cables? What are the categories? b) List the advantages and disadvantages of optical fiber cable?	Understanding	5
7	a) Explain the following i) Light Detectors ii) Light sources b) What is Laser? Explain different types of Lasers and also its characteristics?	Understanding	5
8	Discuss in detail about a)Terrestrial propagation of waves b)microwave link c)satellite communication	Understanding	5
9	a) Explain about optical sources and detectors in brief. b) What are the advantages of optical fiber over twisted - pair and coaxial cable? c) What is the purpose of cladding in an optical fiber?	Understanding	5
10	a) Compare parallel-conductor transmission lines and coaxial transmission lines. b) Why is single-mode propagation impossible with graded-index optical fibers? Explain	Understanding	5
	UNIT-III **TELEPHONE INSTRUMENTS AND SIGNALS&THE TELEPHONE CIRCUIT**		
1	Explain the working of Electronic telephone and subscriber loop.	Understanding	6
2	a) Briefly describe what happens when a telephone set is taken off hook. b) Briefly describe a local subscriber loop.	Understanding	6
3	a) Discuss the basic telephone call procedures. b) What are basic functions of a telephone set? c) What are the various steps involved in completing a local telephone call?	Understanding	6
4	a) Write about telephone message-channel noise and noise weighting. b)explain about call progress tones and signals	Understanding	6
5	a) Explain the ENQ/ACK & Poll/Select line discipline. b) How do binary synchronous communications achieve transparency?	Understanding	6
6	What are the various voice –frequency circuit arrangements? Explain with diagrams.	Understanding	6
	UNIT-IV **CELLULAR TELEPHONE SYSTEMS&DATA COMMUNICATIONS CODES, ERROR CONTROL, AND DATA FORMATS**		
1	a) Briefly describe the N-AMPS cellular telephone system. b) List the specifications of IS-95 standard	Remembering	6
2	a) Compare cyclic redundancy checking with vertical redundancy checking with an example. b) Describe the following: i)Exact-count-encoding ii) Echoplex.	Understanding	7
3	a) Describe the GSM system architecture. b) What are the advantages and disadvantages of personal communications satellite system?	Understanding	6
4	a) write brief notes on N-AMPS and PCS b) Discuss about the Iridium Satellite System. c) Discuss about the working of digital cellular telephone.	Understanding	6
5	a) Explain the different types of Bar codes that are commonly used. b) Explain the difference between probability of error and Bit error rate.	Understanding	7

S.No	Question	Blooms Taxonomy Level	Course Outcome
6	a) Describe how vertical redundancy checking accomplishes error detection. Explain it with suitable example.	Understanding	7
7	Explain the following i) Morse code ii) Baudot code iii) ASCII code	Understanding	7
8	a)what is redundancy checking? b) Explain the different types of redundancy checking?	Understanding	7
9	a) Distinguish between forward error correction verses error correction by re-transmission. b) Describe discrete bar code and continuous bar code.	Understanding	7
10	a) Explain the following i) Redundancy ii) Echoplex. iii) Exact-count encoding b) What is the purpose of placing compromise and adaptive equalizers in a modem?	Understanding	7
11	a)List the various data communications character codes. b)explain bar codes with example	Remembering	7
	UNIT-V **DATA COMMUNICATIONS EQUIPMENT**		
1	a)Explain about DSU and CSU in detail. b) explain the terms i)probability of Error ii)Bit Error Rate	Understanding	7
2	a) What is the purpose of placing compromise and adaptive equalizers in a modem? b) Discuss about the Voice-Band Modem and its classifications? c) Explain the basic blocks of an asynchronous voice – band modems.	Understanding	7
3	List the ITU-T voice band Modem specifications.	Remembering	7
4	a) Explain about modem control. b) Write short notes on AT command set.	Understanding	7
5	a)write about bell systems compatible voice-band Modems. b) sketch the block diagram of voice band modem	Applying	7
6	Discuss about the Voice-Band Modem and its classifications?	Understanding	7
7	a) Explain probability of Error and Bit Error rate. b)write about the basic functions of DSU and CSU	Understanding	7
8	a) Write a brief note on ITU-T modem recommendations. b) Describe the characteristics of asynchronous voice-band modems.	Understanding	7

3. Group - III (Analytical Questions)

S.No	QUESTIONS	BloomsTaxonomy Level	Course Outcome
	UNIT-I **INTRODUCTION TO DATA COMMUNICATIONS AND NETWORKING** **&** **SIGNALS, NOISE, MODULATION, AND DEMODULATION**		
1	Briefly describe the importance of the Shannon limit for information?	Understanding	3
2	Contrast the clock recovery capabilities with return-to-zero and non return-to-zero transmissions.	Understanding	4

S.No	QUESTIONS	BloomsTaxonomy Level	Course Outcome
3	i) Define bandwidth efficiency. ii) For a 8-PSK system operating at an information bit rate of 64kbps, determine minimum bandwidth and bandwidth efficiency.	Remembering	4
4	For a circuit with a signal power of 100 and a thermal noise power of 0.002 mW, Determine the SNR in absolute and dB values	Applying	3
5	a) What are the various factors involved in designing computer network? Explain. b) For an electronic device operating at 17 ^{0}C with a bandwidth of 25 kHz, determine the Thermal noise power in watts and dBm?	Applying	3
	UNIT-II **MULTIPLEXERS& TRANSMISSION MEDIA**		
1	a) Define velocity factor and dielectric constant and explain how they affect the performance of a given transmission line. b) For a given length of a coaxial cable with distributed Capacitance C = 48.3 pF/m, and inductance L = 241.56 nH/m, determine the velocity factor and velocity of propagation of the wave.	Remembering	5
2	a) List out different types of metallic transmission lines and explain them in detail. b) If a coaxial cable of one meter length has inner conductor diameter of 0.025 inch; and inner diameter of the outer conductor of 0.15 inch. Calculate its characteristic impedance.	Analyzing	5
3	a) Explain the following i) Refraction ii) Snell's law iii) NA iv) Acceptance Angle	Understanding	5
	UNIT-III **TELEPHONE INSTRUMENTS AND SIGNALS&THE TELEPHONE CIRCUIT**		
1	a) An EDD test on a basic telephone channel indicated that a 1600 Hz carrier experienced the minimum absolute delay of 550µS.Determine the maximum absolute envelope delay that any frequency within the range of 800Hz to 2600Hz can experience. b) Explain the working of Electronic telephone and subscriber loop.	Applying	6
2	a)Explain the transmission parameters and private line circuits b) Write the various power measurement units.	Understanding	6
3	The magnitude of the crosstalk on a circuit is 66 dB lower than the power of the signal on the same circuit. Determine the crosstalk in dBx	Analyzing	6
4	A C-message noise measurement taken at -25dBm TLP indicates -72dBm of noise .A test tone is measured at the sameTLP at -25dBm.Determine the following levels: a.Signal power relative to TLP(dBmO) b.C-message noise relative to reference noise (dBrn) c.C-message noise relative to reference noise adjusted to a 0 TLP(dBrnc0). d.signal to noise ratio	Analyzing	6,3
	UNIT-IV **CELLULAR TELEPHONE SYSTEMS&DATA COMMUNICATIONS CODES, ERROR CONTROL, AND DATA FORMATS**		
1	a) Determine the BCC for the following data, and CRC generating polynomials: G(x) = x7 + x5 + x4 + x2 + x+1 ; P(x) = x5 + x4 + x + 1; b) Explain the different types of Bar codes that are commonly used.	Applying	7

S.No	QUESTIONS	BloomsTaxonomy Level	Course Outcome
2	a) What are cyclic codes? Discuss how cyclic codes can be used for error detection. b) Determine the BCC for $G(x)=x^8+x^5+x^3+x^0$ and $P(x)=x^5+x^4+x^2+x^0$.	Applying	7
3	a) Explain about the error correction methods used in data communications. b) For a 12 bit data string of 101100010010, determine the number of Hamming bits required; arbitrarily place the Hamming bits into the data string. Also determine the logic condition of each Hamming bit. Assume an arbitrary single bit transmission error, and prove that the Hamming code will successfully detect the error.	Applying	7
4	a) Compare cyclic redundancy checking with vertical redundancy checking with an example. b) Explain the Hamming code with example.	Analyzing	7
5	Explain barcodes in detail with example	Understanding	7
	UNIT-V **DATA COMMUNICATIONS EQUIPMENT**		
1	explain the terms i)probability of Error ii)Bit Error Rate with example.	Understanding	7
2	Calculate the bandwidth efficiency of a 202 modem with data transmission rate of 1200bps and available bandwidth of 2700 Hz.	Analyzing	7
3	Explain the operation of scrambler and descrambler circuit with example.	Analyzing	7

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