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B.M.S. College of Engineering, Bengaluru-560019

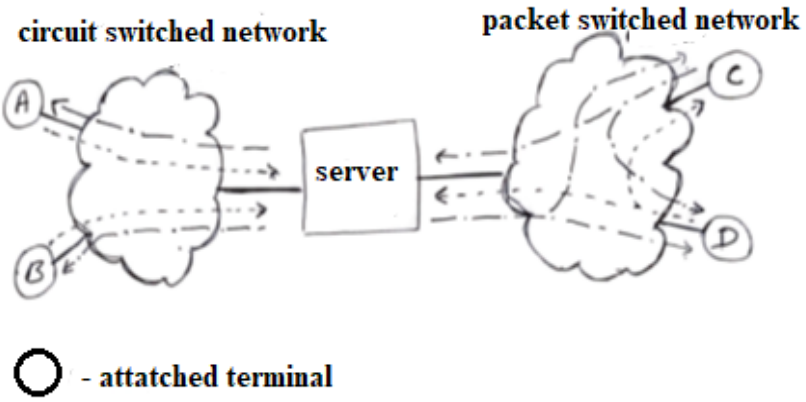
Autonomous Institute Affiliated to VTU

July 2024 Semester End Main Examinations

Programme: B.E. **Semester: V**
Branch: Electronics and Telecommunication Engineering **Duration: 3 hrs.**
Course Code: 22ET5PCSPM **Max Marks: 100**
Course: Signal Processing for Multimedia

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	*CO*	*PO*	Marks
1	a)		Explain the need for modems over a PSTN. With the help of the diagram, show the location of the two modems when two digital devices communicate over a PSTN. Show the type of signal used over each part of the circuit.	*CO2*	*PO1*	**05**
	b)		With neat diagram, explain the function of the telephony gateway in relation to internet telephony.	*CO2*	*PO1*	**08**
	c)		Analyse the given figure to identify the type of multimedia application and justify your answer. Mention the different types of conferencing, specifying the type of media involved in it. 	*CO3*	*PO2*	**07**
			UNIT - II			
2	a)		Compare formatted and unformatted text.	*CO2*	*PO1*	**05**
	b)		Derive the transmitted bit pattern corresponding to the character string “AAABCB” using adaptive Huffman coding. Consider the initial code given by A: 00001, B: 00010, C: 00011.	*CO3*	*PO2*	**08**

		c)	Explain the principle of operation of the LZ compression algorithm. Assuming a dictionary of 4096 words and the average number of characters per word is 6, derive the average compression ratio that is achieved relative to using 7 bit ASCII codewords.	*CO3*	*PO2*	**07**
			OR			
	3	a)	Compare lossy and lossless compression.	*CO2*	*PO1*	**04**
		b)	Consider the transmission of the message containing the character string 'bbbc'. The character set and the associate probabilities are given as a= 0.5, b= 0.4, and c=0.1. Derive the code word value for the given character string using arithmetic coding. Assuming this is received by the destination, explain how the decoder determines the original string from the received code value.	*CO3*	*PO2*	**09**
		c)	Explain the principle of operation of the LZW compression algorithm. Assume an application uses 256 entries in the dictionary. If this number of locations become insufficient, derive the means to increase the size of the dictionary to 512 locations.	*CO3*	*PO2*	**07**
			UNIT - III			
	4	a)	Explain progressive scanning with neat diagram. Mention the need to refresh the television screen continuously. What is the typical frame refresh rate required?	*CO2*	*PO1*	**06**
		b)	Identify the five main stages associated with the baseline mode of operation of JPEG and with neat diagram of JPEG encoder, describe of the role of each stage.	*CO2*	*PO1*	**10**
		c)	Consider the PAL system where 49 lines are used to carry control and other informations. What is the number of scan lines and visible lines per frame? Derive the number of pixels per scan line that are used to obtain square pixels assuming a 4/3 aspect ratio.	*CO3*	*PO2*	**04**
			UNIT - IV			
	5	a)	Explain the main features of the MIDI standard and its associated messages. Compare MIDI with digital audio.	*CO2*	*PO1*	**07**
		b)	With neat diagram, explain the linear predictive coding.	*CO2*	*PO1*	**08**
		c)	Assume the CD-DA standard with the sampling rate of 44.1ksps and 16bits per sample is used, derive i)the total bit rate ii)the storage capacity of a CD-ROM to store a 60-minute multimedia information. iii) the time to transmit a 30 second portion of the information using the transmission channel of bit rate 1.5Mbps	*CO3*	*PO2*	**05**

			OR			
	6	a)	Explain the principle of operation of a PCM speech codec with neat diagram.	*CO2*	*PO1*	**07**
		b)	With neat diagram, explain the operation of fixed bit allocation mode as used with a Dolby AC-I coder.	*CO2*	*PO1*	**08**
		c)	Assume the bandwidth of a music signal is from 15hz through to 20kHz Derive the bit rate generated by the digitization procedure assuming the Nyquist sampling rate is used with 16 bits per sample. Derive the memory required to store a 10 minute passage of stereophonic music.	*CO3*	*PO2*	**05**
			UNIT - V			
	7	a)	With neat diagram, explain how two colour difference signals of a PAL system are transmitted within the same frequency band as that used for the luminance signal.	*CO2*	*PO1*	**06**
		b)	With neat block diagram explain the encoding procedure of P-frames. How are the P-Frames decoded?	*CO2*	*PO1*	**08**
		c)	Derive the bit rate that results from the digitization of the 625-line system using the 4:2:2 digitization format and 4:2:0 digitization format. Hence, compare and analyze the need for the chroma sub-sampling in video compression.	*CO3*	*PO2*	**06**

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