Reg. No.



V SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING) ONLINE EXAMINATIONS, JANUARY- FEBRUARY 2021

COMMUNICATION SYSTEMS [ELE 3151]

REVISED CREDIT SYSTEM

REVISED CREDIT STSTEW				
Time:	: 3 Hours DATE: 28	JANUARY 2021	Max. Ma	rks: 50
Instructions to Candidates:				
	 Answer ALL the questions. 			
	 Missing data may be suitably assumed 	and mentioned.		
	 Draw block diagrams wherever necess 	sary.		
	Steps to obtain the final answer must	be shown clearly.		
1A.	Let $cos(2\Pi f_c t + \Phi)$ denote the local of SSB demodulator. Show the endetector output. Consider USB-SSB	carrier applied to the product matrice of phase error Φ in the case the received signal.	odulator coherent	(04)
1B.	Consider the signal $s(t) = \begin{cases} 2, & 0 \leq \\ -1, T/2 \leq 1 \end{cases}$	$t \le \frac{T}{2}$ $\le t \le T$		
	Solve and plot the matched filter ou of time.	tput sampled at t=T of s(t) as a	function	(04)
1C.	Show that for distortion less demo detector the frequency response equation $H(f-f_c)+H(f-f_c)=$ constant	dulation of a VSB signal using o H(f) of the VSB filter must sat for f <fm.< th=""><th>oherent isfy the</th><th>(02)</th></fm.<>	oherent isfy the	(02)
2A.	Explain, how the effects of noise ar	e minimized in PCM, with diagra	m.	(03)
2B.	Explain FM super heterodyne recei why FM is more robust than AM.	ver with help of block diagram.	Explain	(04)
2C.	For a BFSK signal,			
	a) Find the set of orthonormal b	asis functions.		
	b) Determine the coordinates of	message points and then draw th	ne signal	
	constellation diagram.			
	c) Construct the BFSK wavefo	rm for the message signal 01	111000	
	(consider bit rate= carrier fre	equency).		(03)
3A.	Using the DPSK system the binary s and plot the modulated signal wave	tream 1110000111 is transmitte form.	d. Solve	(03)
3B.	In a telecommunication application data stream 1101. The code rate is Graphically represent the system f (101) and (111) using state diagram $a=00$, state b =01, state c=10 and	, a system generates code word $\frac{1}{2}$ and consists of two memory elor the generator polynomial coen and determine the code word. I d=11.	l for the ements. efficients _et state	(04)

- **3C.** In a (6,3) linear block code the parity bits are $b_0=m_0+m_1$, $b_1=m_1+m_2$, $b_2=m_0+m_2$. Assume '+' to be modulo 2 operation.
 - i. Find the code vector for the message sequence [111].
 - ii. If the received sequence is [111101] then evaluate the syndrome vector. If the received sequence is erroneous find the correct sequence.
- **4A.** For the systematic code (6,3) cyclic code with generator polynomial $g(x) = 1+X^2+X^3$. Solve the code word for the message 110.
- **4B.** i. Define processing gain of DS/BPSK system in terms of spread and despread bandwidth, Justify the same using bit period and chip period.
 - ii. A PN sequence is generated using a feedback shift register of length 5. The chip rate is 10⁶ chips per second. Find the following parameters:
 - a. PN sequence length
 - b. Chip duration of the PN sequence
 - c. PN sequence period
- 4C. Let number of MFSK tones (M) = 4 and length of PN segment per hop (k)= 3
 - i. Show the frequency variation for one complete period of the PN sequence in slow FHSS in graphical form, if the input binary data is 1101101110010110 and PN sequence is 101010111011.
 - Show the frequency variation for one complete period of the PN sequence in fast FHSS in graphical form, if the input binary data is 1011110100 and PN sequence
 001001110011010010011001001110
- **5A**. For a climate based daylight modeling lighting scheme, an IoT based weather monitoring system has to be designed. The purpose of the system is to collect data on environmental conditions such as temperature, pressure, humidity and light in an area using multiple end nodes. For the given IoT based weather monitoring system,
 - a) Construct a single process specification chart
 - b) Draw the domain model specification
 - c) Specify the IoT level of deployment and justify the same.
- **5B.** For a smart irrigation system with 5 soil moisture sensors, 3 temperature sensors, 3 humidity sensors, a relay to switch on /off the water pump and Node MCU as a controller,
 - a) Develop a star topology based wireless sensor actuator network scheme (Consider the devices used as ZigBee devices, hence assume appropriate device roles in the ZigBee network while representing the topology)
 - b) Modify the same wireless sensor actuator network to MQTT protocol architecture. Consider Node MCU as the gateway, MQTT server and the application layer as mobile app.
- **5C.** Compare the channel access techniques used in Ethernet and Wi-Fi communication in detail.

(03)

(05)

(04)

(03)

(02)