Manipal Institute of Technology, Manipal
Department of Information & Communication Technology
III- Semester BTech(IT/CCE)-FISAC-2(Take Home Assignment)
Subject: Principles of Data Communication (ICT 2156)
Max marks: 5(Each question carries 0.5 marks)

Instructions:

Q#	Question
1	Consider a device A which has to send the data bits '1 0 1 1 0 0 1 0 0 0 0 1' to another device. Calculate the hamming code generated by device A.
2	For the received hamming code **11010101001**, the corrected code word is _____. Clearly show each step with proper justifications.
3	Draw Shift Circuit Diagram for the Pattern $(x + 1)(x^{15} + x^{14} + x^{13} + x^{12} + x^4 + x^3 + x^2 + x + 1)$
4	Using polynomial method representation, generate the codeword for the data bit sequence 1100 1110 0111 and verify at the receiver's endusing the pattern 10011
5	In SR protocol, suppose frames through 0 to 4 have been transmitted. Now, imagine that 0 times out, 5 (a new frame) is transmitted, 1 times out, 2 times out and 6 (another new frame) is transmitted. At this point, what will be the outstanding packets in sender's window?
6	A telephone modem is used to connect a personal computer to a host computer. The speed of the modem is 56 kbps, the one-way propagation delay is 100 ms, the packet size is 256 bytes, and the probability of an error in a packet is 10^{-4}. 1. Find the efficiency of stop-and-wait ARQ. 2. What window size N is needed to keep the channel busy when there are no transmission errors. For this window size find the efficiency of the go-back-N and selective repeat protocols.

7	A source always has data ready to send. DATA frame contains 7000 bits payload, 500 bits header. ACK frame is 200 bits. The transmission channel has a Data rate of 150kb/s and propagation time of 250ms. Calculate and compare the efficiency if 2-bit and 3-bit sequence number is used.
8	We need to use synchronous TDM and combine 20 digital sources, each of 100 Kbps. Each output slot carries 2 bit from each digital source, but one extra bit is added to each frame for synchronization. Answer the following questions: a. What is the size of an output frame in bits? b. What is the output frame rate? c. What is the duration of an output frame? d. What is the output data rate? e. What is the efficiency of the system (ratio of useful bits to the total bits).

9	Ten sources, six with a bit rate of 200 kbps and four with a bit rate of 400 kbps are to be combined using TDM with no synchronizing bits. Answer the following questions about the final stage of the multiplexing:
	What is the size of a frame in bits?
	    b) What is the frame rate?
	    c) What is the duration of a frame?
	    d) What is the data rate?
	    e) [Each output slot carries 1 bit from each digital source]

10	Assume that the primary HDLC station in NRM has sent six I-frames to a secondary. The primary's N(S) count was three (011 binary) prior to sending the six frames. If the poll bit is on in the sixth frame, what will be the N(R) count back from the secondary after the last frame? Assume error-free operation.