

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, July 2020

Course: Analog and Digital Communication
Program: B. Tech Electronics and Communication engineering
Course Code: ECEG 2033

Semester: IV
Time 03 hrs.
Max. Marks: 100

Instructions:

1. Attempt all the questions (Theory, Numerical, Case study etc.) on A4 size blank sheets.
2. Attempt all questions serially as per question paper.
3. Answer should be neat and clean. Draw a free hand sketch for circuits/tables/schematics wherever required.
4. Scan the whole answer script and check the resolution carefully before upload on the blackboard. Note that answer scripts will be considered for evaluation only through Blackboard. No other mode of submission is acceptable.
5. You are expected to be honest about each attempt which you make to progress in life

SECTION A [40 Marks]

S. No.		Marks	CO
Q 1	An engineer designed a digital link between two stations. There is direct line of communication radio link between the two stations. The maximum allowable bandwidth supported by the link is 40 kHz. The engineer recorded a speech signal for 5 minutes. The maximum allowable frequency of this speech signal was limited to 10 kHz. It was converted into streams of 0s and 1s using PCM technique. The number of bits required to encode one sampled signal is 6. The PCM signal is fed into a modulator operating at 750 MHz of carrier frequency. Which type of digital modulation scheme the engineer has to choose for an uninterrupted transmission? Justify.	10	CO4
Q 2	Design the Receiver diagram of Binary Phase Shift Keying Modulation scheme. If the incoming data rate to it is 10 kbps and the carrier frequency is 50 kHz, then write down the frequency at each path of the transceiver.	10	CO3
Q 3	A television signal is broadcasting over a suitable band. The initial frequency of the band is 10N (MHz), where N is the last 2 numerical digit of your enrollment number. Sketch a neat spectrum of Television transmission as per NTSC and PAL system. Clearly mention the picture, sound and color position on it.	10	CO2

NOTE : The submission time of the Question Paper Answer Sheet is 24 Hrs from the scheduled time (exceptional provision due to extraordinary circumstance due to COVID-19 and due to internet connectivity issues in the far-flung areas).

No Submission will be entertained after 24 Hrs

Q 4	<p>A message signal $2\cos 50\pi t$ modulates a carrier of frequency 100 MHz. The maximum frequency deviation of the resultant FM signal is 60 Hz. Determine</p> <p>(a) No. of bands in the resultant FM wave. (b) Bandwidth of the resultant wave. (c) Band range of the resultant wave.</p> <p>Bessel Function values</p> <table border="1" data-bbox="201 495 1182 810"> <thead> <tr> <th>n/β</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0.7649</td> <td>0.2238</td> <td>-0.2601</td> <td>-0.3971</td> <td>-0.1777</td> </tr> <tr> <td>1</td> <td>0.4439</td> <td>0.5768</td> <td>0.3391</td> <td>-0.066</td> <td>-0.3228</td> </tr> <tr> <td>2</td> <td>0.1149</td> <td>0.3529</td> <td>0.4861</td> <td>0.3641</td> <td>0.0467</td> </tr> <tr> <td>3</td> <td></td> <td>0.1289</td> <td>0.3091</td> <td>0.4302</td> <td>0.3648</td> </tr> <tr> <td>4</td> <td></td> <td></td> <td>0.1320</td> <td>0.2811</td> <td>0.3909</td> </tr> <tr> <td>5</td> <td></td> <td></td> <td></td> <td>0.1321</td> <td>0.2608</td> </tr> <tr> <td>6</td> <td></td> <td></td> <td></td> <td></td> <td>0.1308</td> </tr> </tbody> </table>	n/β	1	2	3	4	5	0	0.7649	0.2238	-0.2601	-0.3971	-0.1777	1	0.4439	0.5768	0.3391	-0.066	-0.3228	2	0.1149	0.3529	0.4861	0.3641	0.0467	3		0.1289	0.3091	0.4302	0.3648	4			0.1320	0.2811	0.3909	5				0.1321	0.2608	6					0.1308	10	CO1
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SECTION B [Numerical and Short/broad Answers] 60 Marks																																																			
Q 5	<p>Define Nyquist Sampling theorem. Find out minimum sampling frequency of a signal band limited from 2.5 MHz to 4.5 MHz.</p>	10	CO2																																																
Q 6	<p>What are the advantages and disadvantages of BPSK over BFSK?</p> <p>Draw the waveform and eye diagram of the two and from this diagram find the bit spacing.</p>	10	CO3																																																
Q 7	<p>For the given input sequence of 11000010000000001 from the output of a PCM encoder, sketch the voltage waveform for AMI, Polar RZ, HDB3, B6ZS and B8ZS type of line coding</p>	10	CO4																																																
Q 8	<p>Deduce the formula for finding the total power of AM wave. When a broadcast AM transmitter is modulated by 50%, its power is 12 KW. What will be the power when the modulation index is increased to 80%.</p>	10	CO1																																																
Q 9	<p>Design the MODEM using Binary Frequency Shift Keying Modulation scheme.</p>	10	CO3																																																
Q 10	<p>Code the following set of message by using both of Huffmann Coding . .</p> <p>[M] = M₁ M₂ M₃ M₄ M₅ M₆ M₇ M₈ M₉</p> <p>[P] = 0.20 0.15 0.15 0.14 0.10 0.09 0.05 0.10 0.02</p>	10	CO4																																																

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