Register Number:……..

KUMARAGURU
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B.E DEGREE EXAMINATIONS: MAY 2018

(Regulation 2015)

Sixth Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U15ECT504**:** Communication Engineering

COURSE OUTCOMES

CO1: Explain the basic building blocks of communication systems.
CO2: Analyze the performance of amplitude modulation techniques.
CO3: Demonstrate knowledge of angle modulation techniques.
CO4: Compare noise performance of receivers.
CO5: Understand the concepts of information theory.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 1 = 10 Marks)

1. Match the following: CO5 [K_2]

List I	List II
A.	i.
B.	ii.
C.	iii.
D.	iv. –

	A	B	C	D
a)	ii	i	iii	iv
b)	iii	iv	ii	i
c)	ii	iv	i	iii
d)	iii	i	ii	iv

2. Sequence the following processing as given for a TRF receiver. CO2 [K_2]
   1. Speaker
   2. RF amplifier
   3. Audio amplifier
   4. AM demodulator

a) 2-1-4-3 b) 1-3-2-4
c) 3-4-2-1 d) 2-4-3-1

3. Which of the following sentences are correct: CO2 [K_2]

1. DSB-SC is a bandwidth efficient variation of DSB-FC.
2. SSB-SC needs complex coherent receiver.
3. Vestigial Side Band Modulation is used for audio signal transmission
4. All types of AM modulated signals can be demodulated using coherent receiver.

a) 1,3 b) 1,4

c) 1,2 d) 2,4

4. A carrier is frequency modulated by a 2 KHz sin wave resulting in a maximum frequency deviation of 5 KHz. The bandwidth of the FM signal generated is _____. CO3 [K_2]

a) 5 KHz b) 14 KHz

c) 10 KHz d) 7 KHz

5. Assertion (A): Frequency Modulation is a nonlinear operation CO3 [K_2]

Reason (R): Linear combination of two different frequencies will not produce new frequency components.

a) Both A and R are Individually true and R is the correct explanation of A b) Both A and R are Individually true but R is not the correct explanation of A

c) A is true but R is false d) A is false but R is true

6. Average power of a FM signal is equal to CO3 [K_2]

a) Twice the carrier power b) infinity

c) Carrier power d) One fourth of the carrier power

7. Narrow band noise can be represented as a CO4 [K_2]

a) Complex random process b) Constant

c) Real number d) White noise

8. Noise generated in a resistor due to the random motion of free electrons is an example for CO4 [K_2]

a) Shot noise b) Thermal noise

c) Channel noise d) Narrow band noise

9. Assertion (A): Information associated with a symbol is inversely proportional to its probability of occurrence. CO5 [K_2]

Reason (R): Entropy of a Discrete Memory less Source is always greater than zero.

a) Both A and R are Individually true and R is the correct explanation of A b) Both A and R are Individually true but R is not the correct explanation of A

c) A is true but R is false d) A is false but R is true

10. In a binary communication system, let the probability of sending a 0 and 1 be 0.3 and 0.7 respectively. The entropy of the source will be_____. CO5 [K_2]

a) 1 b) 2.25

c) 0.7 d) 0.11

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

11. What are the uses of frequency shifting? CO1 [K_2]
12. What should be the i/o characteristics of a frequency doubler circuit? CO1 [K_2]
13. Draw the phasor diagram for a narrowband FM and AM signal. CO2 [K_2]
14. State Carson's rule. CO3 [K_2]
15. Compare AM and FM transmission. CO3 [K_2]
16. List the different types of noise. CO4 [K_2]
17. What is white noise? CO4 [K_2]
18. Why do we need Pre-emphasis and De-emphasis for FM transmission? CO4 [K_2]
19. Define source coding theorem. CO5 [K_2]
20. Determine the channel capacity of a telephone channel with a bandwidth 4000 KHz and SNR 3dB. CO5 [K_2]

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 300 words)

Q.No. 21 is Compulsory

21. i) Design an Armstrong FM transmitter for the carrier frequency $f_c = 96.3$ MHz and $\Delta f = 20.48$ KHz at the antenna. A Narrowband FM generator with f_c 150 KHz and Δf= 10 Hz is available. In addition, an oscillator with adjustable frequency from 13 to 14 MHz is also available for mixing, along with bandpass filters of any specification. Only a limited number of frequency doublers are available as frequency multipliers. (10) CO3 [K_3]

ii) Consider a telegraphic source having symbols dot and dash. The dot duration is 0.2 sec. The dash duration is 3 times the dot duration. The probability of the dot's occurrence is twice that of the dash, and the time between symbols is 0.2 sec. Calculate the information rate of the telegraph source. (4) CO5

22. How the DSB –FC signal is demodulated using coherent and non coherent techniques? Explain with necessary illustrations. CO2 [K_3]

23.	What are the advantages of super heterodyne receiver over Tuned Radio Frequency receiver? Draw the schematic diagram of super heterodyne receiver and explain in detail.		CO2	[K_L]
24.	i) Explain the operation of reactance modulator with necessary diagrams. ii) How PLL can be used as a FM demodulator.	(8) (6)	CO3	[K_3]
25.	With circuit diagram and necessary equations justify the Faster Seeley discriminator coverts frequency into voltage variations.		CO3	[K_3]
26.	Derive the figure of merit and analyze the noise characteristics for a FM receiver.		CO4	[K_3]
27.	Consider a Discrete Memoryless Source with five symbols ($s_1, s_2, s_3, s_4, and\ s_5$) and the probabilities 0.4, 0.1, 0.15, 0.19 and 0.16 respectively. Construct Shannon-Fano and Huffman code and compare its efficiency.		CO5	[K_3]

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